AN INVESTIGATION OF A MULTIFACTOR APPROACH TO PREDICTING ACHIEVEMENT IN COLLEGE

By

JAMES RAWSON FISHER

A DISSERTATION PRESENTED TO THE GRADUATE COUNCIL OF
THE UNIVERSITY OF FLORIDA
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE
DEGREE OF DOCTOR OF EDUCATION

UNIVERSITY OF FLORIDA

April, 1966

Dedication

This dissertation is gratefully dedicated to the students of Monroe Community College....

I have eaten your bread and salt
I have drunk your water and wine
The deaths ye died I have watched beside
And the lives ye led were mine.....

Rudyard Kipling
Departmental Ditties, Prelude, Stanza I

ACKNOWLEDGMENTS

The writer of this dissertation is indebted to an unusually large number of persons for the completion of this research.

Dr. LeRoy Good, President; Dr. James P. Walsh, Dean of Faculty; Dr. Leonard B. Smith, Dean of Students; Mr. Richard Z. Glerum, Director of Counseling; and Mr. John Trevisan, Director of Student Activities; all of Monroe Community College, Rochester, New York, are due the enduring gratitude of the writer for their indispensable help, assistance and encouragement in facilitating the collecting of the data for this research. Quite truthfully, the job could not have been done without the help of these men and the support of the students and staff of Monroe Community College.

The writer wishes to acknowledge his thanks to Dr. Jay L. Chambers of the Kentucky State Hospital, Danville, Kentucky, for suggesting the original idea for this project. Dr. Lewis R. Lieberman of the Charles L. Mix Memorial Fund deserves the gratitude of the writer for unflagging help at every step of the way. He made the facilities of the Mix Fund available and was a constant source of encouragement and ideas.

Dr. Theodore Landsman, the writer's chairman, always strove to pull the present writer down from the clouds and to point the way to the goal. The other committee members, Dr. Richard J. Anderson, Dr. David Lane, and Dr. Harold Lewis generously gave their help, encouragement and participation. All of the writer's committee contri-

buted to the writer's intellectual and emotional growth.

The writer is indebted to Mrs. June Shumake for typing the manuscript under considerable pressure and to his wife, Eloise, for her 11th hour help on the final draft copy and her continuing support from beginning to end.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

INTRODUCTION

There has been an unfortunate tendency in U. S. higher education to regard the student as a bodiless intellect into whom "learning," "knowledge," and "wisdom" are poured. Colleges have selected their students primarily on the basis of their high school grades and various scholastic aptitude tests. In spite of these selection procedures, there has been a high rate of academic mortality in our colleges and universities. The following examples serve to illustrate this attrition. There were approximately 2,500 freshmen admitted to the University of Florida in September, 1948. Less than 1,000 (or 40%) of these freshmen graduated in June, 1952. In September, 1962, there were 520 freshmen admitted to the liberal arts program of Monroe Community College at Rochester, New York. Exactly 62 (or approximately 12%) of the original 520 graduated in June, 1964. A survey of nine senior colleges in the University System of Georgia for the academic year of 1964 (18) showed a freshman year attrition rate ranging from 10 percent at Georgia Tech to 58 percent at Georgia State College (Atlanta). It is granted that a certain number of those who did not graduate with their classmates probably did eventually secure their degrees. However, it would appear that higher education involves a heavy toll in in time, money, and human investment.

Relative prosperity plus population growth have resulted in larger and larger number of applicants seeking entrance to all kinds of institutions of higher learning. The United States Office of Education (41) has reported that in the decade from 1955 to 1965, enrollment in U. S. colleges doubled - from 2.7 million to 5.6 million. The total is expected to exceed six million by 1966, to reach 7.2 million by 1970, and to exceed 9 million by 1975. Profound shifts in science, technology, and employment practices have made a "college education" seem imperative to a much larger proportion of the work force.

College administrators have sought many ways of screening the growing number of applicants. Until recently, this screening process depended primarily upon grades and measures of intellectual aptitudes. The results were usually statistically respectable. Academic aptitude tests have usually yielded correlations with grades in the high .50s and low .60s. As an illustration, Pillner (6, p. 447) cites a mean r of .55 for 24 validity coefficients obtained in validation studies with the College Qualification Tests. Cronbach (15, p. 116) cites a study involving the Iowa Tests of Educational Development (ITED) and 634 freshmen in six Iowa colleges. The ITED were administered to these students when they were in the ninth grade of high school. Their freshman grade point averages four years later correlated with the ITED .58. Unfortunately, the validity coefficients, cited above, fail to account for, or predict, the failure of large numbers of college students.

A Review of the Literature

In commenting on the above situation, Chauncey and Fredrickson (26) state: "While some improvement in prediction of college success may come from further refinement of aptitude and achievement measures, it would seem that the greatest advance may come through a thorough exploration of personal qualities."

Chamberlin, et al (14), writing a summary of the research on students who were permitted to enter college after having attended "progressive" and experimental schools, concluded that "intangible" factors relating to personality and value system were definitely related to academic success in college.

Holland (19) concluded that success in college can be predicted more effectively with personality measures than merely intellectual measures and suggested that college achievement is the result of a general cluster of personality and aptitude variables.

Super (37) has pointed out that the ability of intelligence and/or academic aptitude tests to predict academic achievement in high school is much better than their ability to predict academic achievement in college. Super notes that the college population represents a more homogeneous population with a smaller range of ability. The result is an artificial shrinkage in obtained correlation coefficients where conventional intellectual measurements are used to predict college academic achievement.

Terman and Oden (39) however, have demonstrated the fact that high ability persons are much more likely to succeed in college than persons of mediocre ability.

Tiebout (40) conducted a three-year clinical study of female students at Sarah Lawrence College. In discussing what he chose to call the "Lazy Student Syndrome," Tiebout observed that the able but unsuccessful student:

1. Shows a need to rely upon strong and immediate motivations to start studying.
2. Shows a tendency to have interests of a transitory nature.
3. Shows a tendency to be governed by strong hedonistic principles.
4. Displays a deep-seated problem in learning.

Further observations by Tiebout were that his subjects displayed a superficial and haphazardly disorganized quality pervading written work submitted by the students. He also observed a tendency to gloss over failures, to rationalize poor achievement, to procrastinate and yet to show continued optimism about changing for the better.

R. J. Roberts, (33) a researcher for the National Merit Scholarship Corporation, studied 887 male National Merit finalists and commended students with scales he developed to predict first year grades and science, writing, art, music, speech, and leadership achievement in college. He obtained validity coefficients ranging from .15 to .38 on his scales in a cross validation with 300 additional male students. Similar results were obtained in a cross validation with 681 female students. Roberts felt his scales were "robust" in view of the fact that they held up when he went to a

different-sex sample. Roberts argued that a statistically significant correlation of .20 was valuable for prediction when dealing with academically talented students. He cited several studies (20, 21, 31, 33) where researchers have as a result of their investigations, characterized the high grade achiever to be conforming, feminine, lacking in dominance, timid and passive. The high achiever is further described by these researchers as lacking potential for originality and self-control. In commenting on these observations, Roberts concluded that, in his study, the high achiever was more likely to be less active, less social, have fewer interests and less competent in practical matters than were "C" students.

Nichols (31), another investigator with the National Merit Scholarship Corporation, found that the best predictor of college grades, after high school rank, was a non-intellective grade scale he assembled. This scale was derived from items in the Objective Behavior Inventory; and the California Psychological Inventory. The resulting scale was able to predict college grades better than the National Merit Scholarship Qualifying Test did. In this study, the best predictor of college grades was rank in high school class (HSR) followed by the non-intellective grade scales and finally by aptitude test scores. The non-intellective scales added to the prediction of grades in a regression equation including HSR and test scores. The best predictors of extra-curricular achievement were the non-intellective achievement scales. Nichols' sample consisted of 1,013 National Merit Finalists. The scales were cross-validated using additional samples of 179 male and 138 female merit finalists and

201 male and 218 female students of average ability. As in Robert's study, previously cited, Nichols not only used freshman grades as criteria, but he used achievement in leadership, science, art, music, writing, speaking, dramatics and athletics. The following items from the Adjective Check List were found to significantly differentiate the high grade achievers from the low grade achievers; high grade achievers reported themselves as ambitious, capable, conscientious, dependable, efficient, helpful, methodical, modest, patient, quiet, resourceful, self-confident, timid, well-adjusted, and withdrawn. The low grade achievers reported themselves as boastful, carefree, careless, cynical, disorderly, high strung, impulsive, irresponsible, lazy, messy, rebellious, and sophisticated. Nichols reported that the items from the California Psychological Inventory which showed significant discriminating ability tended to support the general impression that the high grade achiever is more likely to be compulsive and conforming.

Shaw and Brown (35) studied able achievers and non-achievers at Chico State College (California). These investigators found that the pattern of "non-achievement" in their sample did not start suddenly in college but was present in the lower grades of school. The only significant difference Shaw and Brown could find between achievers and non-achievers on 4 academic indexes and three personality tests was that the non-achievers were "characterized by an attitude of hostility or hyper-criticalness with respect to people which might not necessarily be shown in overt behavior." Shaw and Brown concluded:..?..underachievement on the part of bright students

is not a surface phenomenon easily modifiable, but rather is related to the basic personality matrix of the individual." Shaw, particularly, felt through counseling with "under achievers," that these people often have unconscious attitudes of hostility toward authority figures.

In a very intensive study of 105 high school students in the Chicago area, Lichter, et al (23), found that the distribution of intelligence among drop-outs was somewhat similar to the distribution of intelligence of those who remained in school. Although low intellect could account for a large percentage of drop-outs, there was still a large percentage that were judged impaired in seeking an education because of inadequately functioning personalities. Lichter and his associates argued for an approach to the problem of academic failure through the dimension of personality, rather than intellect, as such.

Brown and Holtzman (5), using the Survey of Study Habits and Attitudes (SSHA) with University of Texas undergraduates, obtained a multiple r of .720 with grades, for men; and a multiple r of .744 with grades, for women. This study utilized a multiple correlation of the ACE Psychological Aptitude Test and the SSHA to predict semester grades.

Another study using multiple correlation of several variables was undertaken by K. S. Kim (22). He combined the SSHA with the Stern Inventory of Beliefs and the language section of the ACE Psychological Aptitude Test to predict grades over a single semester. Kim obtained a multiple r of .68 which shrank to .65 in a cross-validation. He found all three of his instruments making useful

contributions to his total correlation. Nineteen percent of the variance in his results were contributed by the ACE; 20% by the SSHA; and 8% by the Stern Inventory of Beliefs. Kim stated that further research was needed to determine the extent to which non-intellectual factors contribute to scholastic achievement.

Other researchers have used portions of the Minnesota Multiphasic Personality Inventory (MMPI) that have appeared to have a relationship to personality factors affecting achievement.

McQuarry (28) found 24 MMPI items that tended to differentiate "under," "over," and "normal" achievers. This scale proved to be quite effective when cases were taken from above the 40th and below the 60th percentile of the ACE Psychological Aptitude Test.

Altus (3), working with the MMPI, reported that 60 items on the instrument correlated .23 with grades in college and that 26 items correlated .39 with college grades. Altus drew a clinical impression of the low achiever featuring immaturity, femininity, and social extroversion. The feminity observation would seem to run counter to the observations of Roberts (31) and others.

Gough (16), using a technique similar to Altus, developed a scale of 36 items, 16 of which came from the MMPI, that correlated .38 with college grades.

Malloy (27) found that the ACE language score, plus the Life Experience Inventory, plus the Iowa English Achievement Test considerably improved the ability to predict academic success.

Recently, an attempt has been made to use a projective method

to predict academic failure or success. Chambers developed a projective instrument using Murray's Need-Press system (30) to weigh values, needs, and association of values and needs in the individual. Chambers (12) developed a drop-out vs. survivor index from a sample of male students at a junior college in Georgia with his projective test. Male drop-outs were matched for intelligence on the verbal portion of the Scholastic Aptitude Test with surviving students. A cross-validation was run using this index on a new sample of students the following year. Chambers reports he was able to identify the drop-out and the survivor in 80% of all cases. Chambers calls his test the Picture Identification Test (PIT). Other PIT studies were made on samples of students at Georgia Southern College and the University of Florida (9). Using a discriminant function technique, Chambers, et al, was able to identify 66% of the male drop-outs; 71% of female drop-outs; 64% of male survivors; and 71% of the female survivors from his University of Florida sample.

Fishman (34) in his comprehensive review of the problem of prediction of college performance, raises many questions and makes several telling points. He concedes that attempts to predict college performance are worthwhile: "American secondary schools and colleges frequently pursue quite separate, if not antithetical, programs." Hence, colleges must attend to their selection procedures.

Fishman points out that there have been over 1,000 studies of this general nature since 1920. He challenges their theoretical formulation and suggests that this is why they have not enjoyed more

saltatory improvement in their results.

Fishman classifies studies of the problem into 9 possible categories and then points out that 3 of these have appeared most "practical" and have been conducted, in decreasing numbers, in the following order:

1. Intellective predictors, only, to predict intellective criteria, only.
2. Non-intellective predictors, only, to predict intellective criteria only.
3. Both non-intellective and intellective predictors to predict intellective criteria, only.

Fishman offers three salient criticisms of studies which attempt to predict college performance:

1. There has been too heavy reliance on intellective criteria rather than non-intellective criteria (perhaps the most important outcomes of a college education are not measured by grades). (It would seem that studies by Roberts (33) and Nichols (32) were attempts to satisfy Fishman's criticism).
2. Non-intellective predictors combined with intellective predictors have not had notable success, but, to quote Fishman: "...at the empirical level the issue is still an open one. Perhaps all we need is the 'better personality test' for which so many have been searching so long..."
3. Fishman argues that high school grades and aptitude and

intelligence tests may already be saturated with non-intellective factors and that this may explain why multiple correlation designs using "personality" instruments do not do any better than they have.

The Purpose and Need for this Research

This study attempted to investigate the suggestion of Chauncey and Fredrickson (20), that the area of personality offers the greatest opportunity to understand more about the dynamics of achievement.

The literature is tantalizingly replete with the promise of, and hope for, the "better personality test" referred to by Fishman (34). The initial promise of Chambers' earlier studies (9, 12) with his PIT test on Southern college students raises among other questions: Would this projective instrument demonstrate any ability to predict academic survivability in an urban, Northern college where the Need-Press might be quite different? Another question worthy of investigation is: The fact that studies of achievement in two Southern colleges (Texas and L.S.U.) showed the SSHA developed by Brown and Holtzman (6, 22) to be making very good contributions to the prediction process. Yet Ahmann and Glock (1, 2), in studying student populations at Cornell, were unable to find any significant contribution being made by the SSHA in the prediction of college achievement. Would Ahmann and Glock's results be verified on another New York sample, this new sample being composed of somewhat different personnel than that attending a school such as Cornell?

The global picture, that seems to emerge from the literature,

describing both the achieving as well as the non-achieving college student can hardly be said to be exactly flattering to either group. Given a critical minimum of ability, such as we measure it with today's aptitude tests, those who become achievers are seen by some investigators as: "compulsive," "feminine," "timid," "conforming," "lacking in capacity for originality and/or self control," etc. The non-achiever, on the other hand, is seen as: "governed by strong hedonistic principles," having transitory interests, a rationalizer, "boastful," "carefree," "impulsive," "disorderly," etc. One almost wonders if there can be a rather well integrated achiever, or non-achiever, for that matter.

Murray (30) has proposed that the key to human motivation lies in understanding the need-system of a person. Chambers maintains that his PIT is directly formulated on the Murray thesis and provides an objectively scorable projective instrument (8, 9, 10, 11, 12, 13). If college performance can be seen as a product of the individual's motivation plus his native endowment, then it would seem that a test such as Chambers' PIT might indeed be able to tap some aspects of the college student which might have eluded investigators in the past. Fishman (34) has pointed out that random or deliberate changes in either the college or the student, or both, can greatly upset any well-formulated prediction system. Nevertheless, the present writer believes it is technically impossible, with our present methodology, to design a study that can account for all the possible interactions described by Fishman. It is necessary to

make a more limited approach to the problem.

This research attempted to serve the following purposes:

1. To aid in reducing the margin of error in college admissions.
2. To aid high school counselors in identifying personality characteristics likely to help or hinder a high school student seeking a college education.
3. To assist in the validation of a new type of projective test of personality and to test the validity of a relatively new and different kind of statistical analysis.
4. To test the premise that instruments purporting to measure personality, study habits and attitudes, scholastic aptitude, and intelligence, can be combined, through a multiple regression technique, to increase predictive validity of college achievement.

The need for this study is shown by the high rate of academic failure in our colleges and universities. The present remedy for this attrition, in most colleges, is to raise entrance requirements on the traditional scholastic indexes. But this procedure usually results only in a more intellectually homogeneous group where measures of intelligence cease to be as effective discriminators of college achievement. There is also the more difficult and diffuse question of: "A college education for what, and for whom?" Stated another way, can college benefit the individual and society by providing its services to the person we now regard as marginal academic material?

A new approach is needed.

CHAPTER II

THE DESIGN OF THE STUDY

Much of the literature surveyed by the present writer suggested that understanding and prediction of academic achievement must involve a heavy consideration of individual and personal factors not usually thought of as purely intellectual. One problem, however, is: what personal factors are involved and how are they to be measured or assessed? Studies by Roberts (33), Nichols (32), Holland (19, 20, 21), and by Shaw and Brown (35) have suggested that achievers and non-achievers possess particular personal characteristics and imply these characteristics can be used to identify the achiever and non-achiever. Chambers (9, 12) has argued that his Picture Identification Test taps personality variables related to scholastic achievement. Chambers also maintains that the Picture Identification Test (PIT) is based on the Need-Press concept of Murray (30). For the above reasons, it was felt by the present writer that a validation study of the PIT, involving prediction of college achievement, would be a significant step at present.

Fishman (34) and other writers (31, 33) have pointed out that college achievement also involves more than merely grades. For Fishman it would seem that using intellective predictors to predict intellective criteria is to abstract from the total academic experience to the point of rendering the phenomenon unreal and

irrelevant for college advisement and counseling.

The present writer decided to attempt the two least common of the types of studies cited by Fishman for predicting intellective criteria, only. The present writer grants Fishman the cogency of his view that non-intellective criteria need to be studied. However, it was felt by the present writer that a newly organized Junior College which had no dormitories, no "campus," and little focii for extra-curricular leadership offered little opportunity to test Fishman's argument in favor of a design involving non-intellective criteria.

The two hypotheses that follow, then, attempt to predict intellective criteria by using: I. a non-intellective predictor, only, and II. a combination of non-intellective and intellective predictors.

The Hypotheses:

I. Need-systems of achievers and non-achievers are unlike and these need-systems can be differentiated by a projective test, the Picture Identification Test.

II. The margin of error in the prediction of academic achievement would be appreciably diminished by adding non-intellectual factors such as those contained in the Picture Identification Test and the Survey of Study Habits and Attitudes to a test of scholastic aptitude and a conventional measure of intelligence.

The Variables and Instruments

Academic Achievement

The best index of academic achievement was considered to be the grade point average (GPA). GPA was chosen to measure the dependent variable for this study, academic achievement.

The college providing the sample for this study operates on a "four point" system whereby an "A" for a three hour semester course merits the student 12 honor points. Dividing these points by the semester hours of the course would yield a 4.00 for the three hours of "A" work. A grade of "B" merits three honor points per semester hour; "C", two honor points per semester hour; "D", one honor point per semester hour; and "F", no honor points. A 2.00 overall GPA is thus considered to be a "C" average and the minimum for non-probationary progress toward a degree.

Intelligence

The Otis IQ Test was selected to measure the first independent variable, intelligence. The Otis consists of eighty items to be administered in a 30 minute period. Form Gamma, EM, was used (6).

Academic Aptitude

The College Qualification Tests (CQT) were selected to measure the second independent variable, academic aptitude. The CQT are a series of ability tests developed for use by college admissions officers and school guidance personnel. They consist of three sections each of which yields single test scores and a composite score for the entire battery. The tests are: Test V, considered by its authors to measure verbal aptitude. Test N, considered by the

authors to measure numerical aptitude. And Test I, considered by the test authors to measure information possessed by the subject. Although a timed test, this battery is regarded as largely a power test. The Fifth Mental Measurements Yearbook credits the test authors with constructing an excellent test which comes very close to meeting the criteria set down by an advisory committee of psychologists and educators (6, p. 445-446). Validity coefficients of correlation between this test and GPA range from a low of .34 to a high of .71. The CQT correlate with the ACE Psychological Aptitude Test .78 and with the School and College Ability Test .82. In 19 out of 24 studies, the CQT yielded a correlation with GPA greater than .50. It is interesting to note that there was a pronounced tendency for this instrument to yield a much higher correlation for female than male students (6, p. 445-447).

Study Habits and Attitudes

The instrument chosen to measure the third independent variable in this study, study habits and attitudes, is the Brown and Holtzman Survey of Study Habits and Attitudes (SSHA) (4). The SSHA consists of 75 items derived empirically from similar instruments and studies. The SSHA leans more heavily on "study attitudes" than on techniques of study, or habits of study, according to the authors. The SSHA appears to be fairly independent of intellectual measures such as the ACE Psychological Aptitude Test, the SSHA correlating with this instrument only .25 (5). A review from the Fifth Mental Measurements Yearbook comments, in part: "...more suited for uncovering attitudinal

and motivational difficulties than any other published inventory..." "...Its value for research on counseling and remedial teaching must not be overlooked..." (6, p.782) Research results have ranged from very good to poor. Brown and Holtzman (5) have secured good to excellent results with their instrument on Texas college and high school samples. Kim (22), at LSU, obtained results which suggested the SSHA was contributing considerably to the measurement of non-intellectual factors predicting college achievement. Ahmann and Glock (1, 2), on the other hand, had much less success with this instrument in two studies at Cornell University.

Personality Factors

The instrument chosen to measure some aspects of personality that were thought to be related to the question of academic achievement was the Picture Identification Test (PIT). This instrument is a recent projective development. Based on the Murray theory of Need-Press (30), this test presents the subject with photographs of 36 male (or if the subject is female, then 36 photographs of female) college students between the ages of 18 and 22. The subject is shown 6 cards with the photographs of 6 persons on each of the cards, making the total of 36 photographs as stimuli. The subject is asked to pick the two most-liked and the two least-liked photographs on each of the cards. This procedure results in the subject actually picking a total of 12 most-liked and 12 least-liked photos, and the remaining 12 are automatically placed in a neutral category. The subject is then asked, in a second portion of the test, to identify, through statements describing people in terms of 21 basic personality

needs Murray has reported, the photographs which seem to match these statements. The test is scored objectively and three types of scores are obtained for each of the 21 needs: (a) Ability to judge a need in self and others (Judgment Score); (b) Whether a subject is positive or negative or neutral in attitude toward a need (Attitude Score); and (c) The ability of the subject to associate the need appropriately with other needs (Association Index). A subject receives standard scores, based on his raw score, from a college students norm group collected by Chambers, the test author. All scoring procedures for the PIT are objectively defined so that the test can be scored by electronic data processing equipment. A computer is employed to develop the test matrix from the raw data.

The PIT, as an instrument, is an experimental device and is only about seven years old. For these reasons, most of the early studies performed with this instrument were validation studies. More specifically these investigations were concurrent validity studies for the most part. Chambers and Broussard (10) administered the PIT to 100 men diagnosed as paranoid schizophrenic and to 100 men considered normal. They found significant differences between the need-attitudes of these groups on the PIT. Another study by Chambers and Broussard (11) examined the role of need-attitudes in adjustment. Alcoholic men and chronic undifferentiated schizophrenics were found to have somewhat different need-attitudes when compared to normals and the paranoid schizophrenics of the previously cited study. Chambers (8) also studied the trait judgment of photographs in the PIT and adjustment of college students. Two groups of students, one rated as well

adjusted, and one rated as poorly adjusted, by the faculty at a junior college, were the subjects. The PIT was administered to both groups. It revealed significant differences between both groups on the PIT Judgment Score ($t = 11.09$ $p < .001$).

Chambers and Lieberman (13) investigated the Variability Scale of the PIT and found it to be differentiating among normal, neurotic, alcoholic (male only), manic depressive, and schizophrenic samples. In another study, Lieberman and Chambers (24) administered the PIT to 50 men in a state prison and 50 students in a trade school. By a technique called cluster analysis, profiles thought to be characteristic of "prisoner" and "student" were derived. When the PIT was administered to 44 additional prisoners and 44 additional students, the profiles derived from the first group of prisoners and students correctly classified 76% of the students and 68% of the prisoners in the additional groups ($p < .01$).

Chambers, Barger, and Lieberman (9) studied a sample of 1,016 men and women entering the freshman class at the University of Florida. From this sample of subjects, all of whom were administered the PIT, The School and College Ability Test, a study habits questionnaire, and a self-rating questionnaire, there were 319 male and 189 female drop-outs. These male and female drop-outs were paired with an identical number of male and female survivors from the same freshman class population. A combination of the above instruments was able to identify 71% of female drop-outs and 71% of the female survivors.

The only known reliability study was an unpublished investigation (7) involving 37 adults. Table 1. shows the obtained correlations between test and retest. Table 1. also serves to illustrate the 21 needs taken from Murray's work by Chambers for use in the PIT. It is also worth noting that Table 1. illustrates the 67 scores yielded by the PIT. In addition to produce a Judgment, an Attitude, and an Association Index score for each of the 21 Murray needs, there are Sum J (sum of the judgment raw scores), Sum AI (sum of the association index raw scores), Var (variability), and Con (consistency) scores. The Var scores is a measure of the over-all tendency to use affectively chosen photographs rather than neutral ones for assigning need-descriptions. A high Con score indicates that the subject matched needs with more liked-best than with liked-least pictures, whereas a low Con score indicates the reverse tendency.

The Sample

The sample for this study was selected for homogeneity with respect to age, sex, and type of academic program. There were 254 female freshman nursing students enrolled for the Fall term of 1964-65 at Monroe Community College, Rochester, New York. An attempt was made to include every female nursing student in the freshman class in the sample. Due to the usual administrative problems, it was not possible to test all subjects with all instruments, and in some cases, early withdrawal denied even criterion data, as well as test data, to the present writer.

TABLE 1.--TABLE SHOWING TEST-RETEST CORRELATIONS FOR ADULT RELIABILITY STUDY (7) (N=37)

Need	Judgment	Attitude	Association Index
	r	r	r
Abasement	.21	.38	.47
Achievement	.39	.12	.21
Affiliation	.36	.41	.49
Aggression	.68	.19	.59
Autonomy	.33	.51	.74
Blamavoidance	.46	.39	.41
Counteraction	.57	.64	.50
Deference	.39	.37	.54
Defendance	.10	.32	.62
Dominance	.46	.34	.75
Exhibition	.36	.15	.70
Harmavoidance	.37	.24	.60
Infavoidance	.30	.17	.37
Nuturance	.43	.40	.43
Order	.36	.02	.32
Play	.50	.23	.29
Rejection	.38	.63	.45

TABLE 1.--Continued--TABLE SHOWING TEST-RETEST CORRELATIONS FOR ADULT RELIABILITY STUDY (7) (N=37)

Need	Judgment	Attitude	Association Index
	r	r	r
Sentience	.23	.34	.58
Sex	.46	.29	.06
Succorance	.49	.52	.49
Understanding	.27	.32	.11
	Sum J .73	Var .54	Sum AI .70
		Con .08	

The net sample consisted of 196 women, which is a 78.4% sample of the freshman nursing class. These 196 students were broken down into two sub-samples, A and B. Each sub-sample consisted of 98 students. Assignment to each of these sub-samples was made in the following fashion: IBM cards for each subject, containing GPA data, as well as other information used in the study, were ordered on the basis of grades. The entire sample was ranked from the top GPA to the bottom one. The cards were then separated on an odd-even basis to either an A sub-sample or a B sub-sample. The result was two subsamples of 98 Ss each. Each sub-sample contained 67 Ss with a GPA of 2.00 or better, and 31 Ss with a GPA below 2.00. Significance tests were applied to determine if the sub-sample differed

from each other in a manner that would make statistical comparisons invalid. The t test was chosen to evaluate the data. No significant intergroup differences were found between the sub-samples. Results of the t tests as well as the F tests in this matter can be seen on tables 2 and 3.

After assigning the 196 Ss to two equal groups, it was discovered that some test data were unavailable for 16 Ss. Coincidentally exactly half of these Ss (8) were in each of the sub-samples. The data were analyzed in this manner: (1) Data for the PIT as well as GPA were available for the full sample of 196. Analysis of results for Hypothesis I, concerning the PIT alone, was performed on the complete sample of 196. (2) Analysis to test Hypothesis II was performed, using 6 independent variables from the four instruments, on the 180 Ss for which complete data were available. Thus, for purposes of Hypothesis II, sub-sample A consisted of 90 Ss, 60 "passing" and 30 "failing" cases. (For the purpose of this study, any GPA 2.00 or higher is defined as "passing" or "achieving," any GPA below 2.00 is defined as "failing" or "non-achieving.") Sub-sample B was identical to sub-sample A in that it also contained 60 "passing" and 30 "failing" Ss. An N of 90 was used in the computation of all data pertaining to Hypothesis II, including the data in tables 2 and 3.

The college which was the site of this study, Monroe Community College, Rochester, New York is a newly founded (1961) unit of the State University of New York which opened its doors in September, 1962. The college has no dormitories. It serves a large commuter population in the metropolitan Rochester area. The two basic divisions of the

TABLE 2.--A TABLE OF t DERIVED FROM DIFFERENCES BETWEEN MEANS AND STANDARD DEVIATIONS ON BOTH SUB-SAMPLES AND ALL INSTRUMENTS

Variables	Sub-Sample	N	Mean	S.D.	t	P < .05
Otis IQ	A	90	119.57	7.36	1.563	no
	B	90	117.83	7.49		
CQT	A	90	84.30	16.71	.1965	no
	B	90	84.74	11.67		
SSHA	A	90	60.62	25.89	.0127	no
	B	90	60.67	26.47		
Sum J	A	90	4.00	1.94	.8908	no
	B	90	4.26	1.93		
Sum AI	A	90	4.14	1.91	.3358	no
	B	90	4.24	2.06		
Drop-out Index	A	90	78.44	27.78	1.3648	no
	B	90	84.01	26.66		
GPA	A	90	2.1914	.6977	.1270	no
	B	90	2.2316	.6434		

TABLE 3.--TABLE OF F DERIVED BY COMPARING VARIANCES OF SUB-SAMPLES A AND B ON ALL INSTRUMENTS

Variable	S_1^2 / S_2^2	=	F[a]	P<.05
Otis IQ	56.71/54.76	=	1.036	no
CQT	282.27/137.76	=	2.049	P<.01[b]
SSHA	708.56/677.82	=	1.061	no
Sum J	3.80/3.77	=	1.008	no
Sum AI	4.29/3.69	=	1.163	no
Drop-out Index	740.43/678.50	=	1.086	no
GPA	.4922/.4186	=	1.176	no

a Where S_1^2 equals the larger variance and S_2^2 equals the smaller variance.

b This was the only significant F. A formula recommended for this case (42, p. 157) was used to compute t. The resulting t was non-significant. The formula:

$$t = \frac{X_1 - X_2 - (U_1 - U_2)}{\sqrt{\frac{S_1^2}{N_1} + \frac{S_2^2}{N_2}}}$$

The resulting t was .1965 and is shown in table 2 as the obtained t for sub-samples A and B on the College Qualification Tests (CQT).

college are Arts and Sciences, aimed chiefly at providing senior college parallel work; and the Career division, aimed at providing the myriad programs needed for technical and sub-professional fields in the complex industrial area around Rochester.

The college provides all academic training for the nurses who are students in three diploma schools of nursing operated by local general hospitals. Clinical training is provided by the respective hospital staffs. In addition, the college operates its own two year Associate Degree program in nursing, with the assistance of a Kellogg Foundation grant. Academic training for these two year associate degree students is integrated into the program for the students in the diploma schools. All courses taken by nurses in both programs are identical and are taught by a common faculty. Clinical training for the two year associate degree students is provided in local general hospitals by the College's own nursing faculty.

Statistical Methods

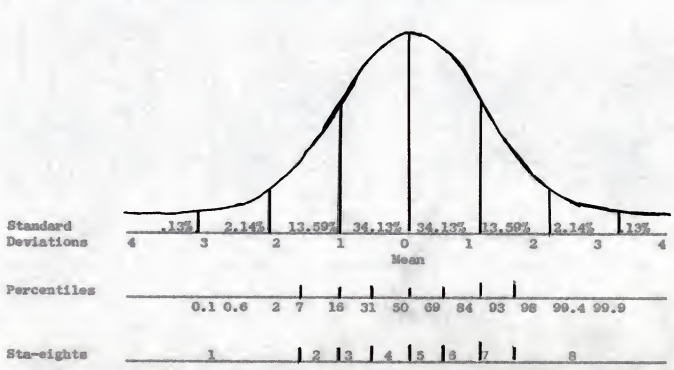
Hypothesis I: Need systems of achievers and non-achievers are unlike and these need-systems can be differentiated by a projective test, the Picture Identification Test.

Analysis of Hypothesis I is based on two methods utilized by Lieberman and Chambers (24, 25) in an earlier study with the PIT. (The second of these papers is a detailed explanation of the cluster analysis method and is attached to this dissertation as Appendix A). The methods are outlined as follows:

First Method: All PIT results were scored by IBM machine. Each S received 67 scores on the PIT which included, among other scores, a Judgment, an Attitude, and an Association Index score for each of 21 needs. Also obtained is a Sum J and a Sum AI score. These latter two scores are summaries of all respective raw scores obtained by a S on Judgment and Association. All scores were converted to eight point standard score scales ("sta-eights"). For an illustration of the Sta-eight see table 4.

PIT profiles of each possible pair of Ss in each sub-sample were compared by computing the absolute differences between every pair of Ss for each of the 67 PIT scores and then summing the differences (Sum D score). The Sum D scores for sub-sample A formed a matrix in which the Sum D score in each cell indicated a relationship between a pair of Ss in the matrix. Since the Sum D is the sum of the differences between a pair of Ss, it is obvious that it would be small for Ss with similar profiles and would increase as profiles became more dissimilar. For the purposes of this study, all Sum D's in the lower 10% of the entire range of the matrix were defined as showing "similarity" between Ss whereas Sum D's in the upper 10% of the range of the entire matrix were defined as showing "dissimilarity." A ratio of similar scores was devised so that the higher the ratio received by the S, the more similarities he holds with non-achieving students, and the more dissimilarities he holds with achieving S. In mathematical terms, the Similarity-Dissimilarity Ratio might be expressed as follows: $R = \frac{SP + DF}{SF + DP}$, where R = Similarity-Dissimilarity Ratio: SP = number of passing students with whom a S

TABLE 4.--A TABLE SHOWING THE MANNER IN WHICH STA-EIGHTS ARE DERIVED



has similar scores; DF = number of failing Ss with whom an S has dissimilar scores; SF = number of failing Ss with whom a S has similar scores; DP = number of passing Ss with whom a S has dissimilar scores. Achievers are thus expected to have high ratios and non-achievers are expected to have low ratios. A cutting score was expected to classify achievers and non-achievers so that a significant number (.05 level of confidence) of achievers would be above the cutting score and a significant number (.05 level of confidence) of non-achievers would be below the cutting score. Significance of these differences was tested by the use of Chi Square.

Second Method: A second test of Hypothesis I was conducted by the use of the cluster analysis technique. The complete details of cluster analysis are discussed in Appendix A of this dissertation. A brief discussion of cluster analysis follows.

The objective of cluster analysis is to derive PIT profiles of different "types" of achievers and non-achievers. It might be helpful to the reader to imagine the cluster profile as an analogy to the profile derived from an MMPI test. There are a great many similarities between these two profiles.

A cluster then, will represent a "personality" type. Clusters are derived on the basis of Sum D scores. Individuals can be included in a cluster only if they have Sum D scores similar to each other. "Similar" is here defined as being in the lowest 10% of the Sum D range of the matrix. It might be helpful here to again refer to the MMPI profile analogy. Similar Sum D scores between two or more Ss on the PIT would give them profiles closely approximating

each other in the same fashion that persons with very similar MMPI profiles are often classified as having similar clinical patterns and behavioral characteristics.

Briefly, the major rules for clustering are:

A. Subjects are contained in a cluster if, and only if, they have similarity scores with all others in that cluster.

B. A subject cannot be counted in more than one cluster.

C. When a subject does otherwise qualify, because of similarity scores, for more than one cluster, the largest cluster is the one chosen to assign the subject to.

The above rules can be represented symbolically:

Given: S = relationship: "has a similar Sum D score to"

A, B, and C = subjects in this study.

X = all other possible subjects that could be compared in this study.

Then: ASB, ASC, and BSC ...and there is no X such that:

XSA, XSB, XSC, then...A, B, and C define a cluster.

The analysis proceeds in the following manner: since the objective is to derive the cluster with the largest number of Ss, the S in the achieving group who has the greatest number of similar Sum D scores is chosen to begin the analysis. Only those subjects who have similar Sum D scores to this subject and to each other are retained in the first cluster. Successive, or additional clusters are derived until no more clusters can be combined. The minimum number of subjects to constitute a cluster is three. This process is repeated on the failing subjects to derive clusters of failing students.

Once the "passing" and "failing" clusters were derived from

analysis of sub-sample A, the clusters were then used to classify the subjects in sub-sample B as "pass" or "fail." The success of this classifying system was evaluated by the Chi Square test.

Statistical Methods

Hypothesis II: The margin of error in the prediction of academic achievement would be appreciably diminished by adding non-intellectual factors such as those contained in the Picture Identification Test and the Survey of Study Habits and Attitudes to a test of scholastic aptitude and a conventional measure of intelligence.

Pearson product-moment coefficients of correlation were computed between GPA and each of the instruments, the PIT, Otis IQ, CQT, and SSHA. Pearson product-moment coefficients of correlation were also computed for all possible intercorrelations between all instruments. The resultant correlation matrix formed the basis on which the Wherry-Doolittle method of computing multiple R was applied in order to predict GPA from the scores of the instruments (17, pp. 392-415). The multiple correlation derived from sub-sample A was cross-validated with sub-sample B. Likewise, the multiple correlation derived from sub-sample B was cross validated with sub-sample A. The cross validation was accomplished in a manner suggested by Mosier (29). The obtained regression equation on sub-sample A was applied to the correlation values for sub-sample B. The obtained regression equation on sub-sample B was applied to the correlation values from the correlation matrix of sub-sample A. Mosier termed this method "double" cross-validation. He argued that this technique permits a maximum use of the data available in the sample and still permits an unbiased estimate of R.

Procedure

All the independent variables were measured through the use of paper-and-pencil instruments. The data contained in the independent variable instruments were collected principally during Orientation Week of September, 1964 at Monroe Community College, Rochester, New York. Some make-up sessions were held to test those who were not present during Orientation Week. The data from the PIT were gathered by administering the PIT during scheduled sessions early in the semester. This data-gathering was completed by November 1, 1964. All independent variable instruments, except for the PIT, were scored at Monroe Community College. The PIT results were sent by mail to the Charles L. Mix Fund, Inc. at Americus, Georgia for punching into IBM cards and subsequent scoring.

The dependent variable, academic achievement, was measured through the use of first semester grades (GPA). These grades were collected in February, 1965. All data were brought to the Charles L. Mix Fund, Inc. for analysis in July, 1965.

CHAPTER III

ANALYSIS OF THE DATA

Hypothesis I

Need-systems of achievers and non-achievers are unlike and these need-systems can be differentiated by a projective test, the Picture Identification Test.

The Similarity-Dissimilarity Ratio:

The statistical and clerical methods used to arrive at this ratio were discussed in detail on pages 27-30 of Chapter II. Lieberman and Chambers (24, 25) used this technique as the first of two they employed in analyzing their data on the prisoner-trade school study. This ratio enabled them to identify 68% of the trade school students and prisoners correctly. Essentially, the present writer used the same instrument and the same technique to attempt to classify achievers and non-achievers in college. Before discussing the resulting Chi Square, it is necessary to define the manner in which the cutting score was devised. When Lieberman and Chambers used this technique to identify Ss as either prisoner or trade school student, they had equal sized groups and could define their cutting score as a median point. The problem in the present study was somewhat more complicated. It will be recalled that sub-sample A, for purposes of Hypothesis I, consisted of 98 Ss. Sixty-seven of these Ss were "passing" and 31 were "failing" Ss. The cutting score for this study had to reflect this proportion. For this reason, the cutting score was chosen as that point which separated the distri-

bution into two groups, 67/98 from the top ratio and 31/98 above the lowest ratio. This point happened to be such that there were exactly four cases with a ratio of 1.00 bracketing it. These four cases were discarded in the computation of the Chi Square. Removal of the four cases reduced the size of the N to 94. A Chi Square employing Yates' Correction was used (42, p. 108). Yates' Correction was employed to compensate for the small number of cases in some of the cells. The resulting Chi Square was non-significant (X^2= .356, df=1). See table 5.

TABLE 5.---A CHI SQUARE CONTINGENCY TABLE SHOWING RESULTS OF SIMILARITY-DISSIMILARITY RATIO (94 Ss IN GROUP A)

	Actual		
	Pass	Fail	Totals
Predicted Pass	46	19	65
Predicted Fail	18	11	29
Totals	64	30	94

X^2 = .356 non-significant df=1

While this technique may have some validity in discriminating between groups such as trade school students and prisoners, it does not seem to have the power to discriminate between achievers and non-achievers in the population investigated in this study. In brief, the hypothesis is not supported by this analysis. This analysis was performed on sub-sample A, only. It was not performed

on sub-sample B due to the non-significant results encountered with the first analysis.

The Cluster Analysis

A second analysis used in testing Hypothesis I was a method known as cluster analysis. This method was discussed on pages 30-31 of Chapter II.

In the present study, the sample was divided into two equal-sized groups of 98. The first group, sub-sample A, was used to develop the cluster profiles and to run the Similarity-Dissimilarity Ratio. The second group, sub-sample B, served as a reference group on which the cluster profiles were used to predict "pass" or "fail."

Fourteen clusters were derived from sub-sample A for use in the first cluster analysis of the present study. Eight were "passing" clusters and 6 were "failing" ones. When the 98 Ss of sub-sample B were classified as "pass" or "fail," according to the similarity of their Sum Ds to the various cluster profiles, the resulting Chi Square was .1272, which was non-significant (df=1). Sixty-four percent of the passing students were correctly classified and 42% of the failing students were correctly classified, or 57% of the total Ss in sub-sample B (see table 6).

TABLE 6.--A CHI SQUARE CONTINGENCY TABLE SHOWING RESULTS OF CLASSIFYING 98 Ss IN GROUP B WITH 14 CLUSTER PROFILES

	Actual		
	Pass	Fail	Totals
Predicted Pass	43	18	61
Predicted Fail	24	13	37
Totals	67	31	98

$X^2 = .1272$ non-significant df-1

An attempt was made to eliminate the less productive cluster profiles in order to raise predictive efficiency, after the fashion of Lieberman and Chambers (24). An inspection of the tabulated results of the cluster predictions in the first cluster analysis, above, showed cluster profiles 2 and 9 to be making a negative contribution to prediction (see table 7). These cluster profiles were dropped, and a second cluster analysis was run. The second cluster analysis yielded a Chi Square of 1.583, which was also non-significant (df=1). The second cluster analysis classified 42% of the failing students, 73% of the passing students, and 63% of the entire 98 Ss contained in sub-sample B (see table 8).

A Post Hoc Analysis

To study further the possibilities of significant differences existing in this data, four additional analyses were performed. Because these are post hoc suggestions, they are not used to support or refute the hypothesis. They are presented as possible exploratory approaches to later research.[1]

The First Post Hoc Analysis: Each subject has a Sum D with each of the 14 cluster profiles. If each cluster is ranked according to how close the subject is to each cluster, then a passing subject, by hypothesis, should be closer to a cluster profile of passing students than to one of failing students. And conversely, failing students should be farther away from the cluster profiles which characterize passing students than they are from profiles

---

[1]The writer is indebted to Dr. Lewis R. Lieberman, Director of Research for the Charles L. Mix Fund, Inc. for suggesting these analyses.

TABLE 7.--A TABLE SHOWING POWER OF CLUSTER TO PREDICT PASSING AND FAILING SUBJECTS

Passing Cluster Number	Hits*	Misses*
01	6	1
02	4	5
03	5	4
04	10	2
05	7	3
06	2	0
07	5	0
08	4	3
Failing Cluster Number		
09	2	9
10	2	3
11	3	7
12	4	1
13	0	1
14	2	3

*A "hit" is defined as a correct prediction by a cluster. A "miss" is defined as an incorrect prediction by a cluster. It was determined, on an arbitrary basis, to discard the poorest performing passing and failing cluster for the second chi square (see table 8) clusters: 02 and 09 met this requirement and were discarded.

TABLE 8.--A CHI SQUARE CONTINGENCY TABLE SHOWING RESULTS OF CLASSIFYING 98 SUBJECT IN GROUP B WITH 12 CLUSTER PROFILES

	Actual		
	Pass	Fail	Totals
Predicted Pass	49	18	67
Predicted Fail	18	13	31
Totals	67	31	98

$X^2 = 1.583$ non-significant df=1

which characterize failing students. Earlier, a computer had been programmed to take each S's Sum D score and compare it with each of the 14 cluster profiles. The computer then reported the cluster profiles each S was closest to so that each of the cluster profiles was ordered for each S. Distribution curves for both passing Ss and failing Ss were tabulated. These curves showed how both groups ranked with respect to the first seven cluster profiles. The first seven cluster profiles were used instead of all 14 because this would avoid a situation where all subjects would have an equal score of 8. Using all 14 clusters would have created a possible situation where all Ss would have had an equal score of similarity to cluster. By taking the first seven clusters (all of which were "passing" clusters), the null hypothesis could be tested. The mean for the passing Ss was 4.7 and the mean for the failing Ss was 4.3. An F test was run to check on the homogeneity of the variances of the two groups. The resulting F was non-significant (F = 1.198; df = 66/30). A t test was run comparing the means and variances of both

groups, and the resulting t was significant ($t=2.202$; $p<.05$; $df=96$). See table 9.

Second Post Hoc Analysis: One of the tantalizing things about the first post hoc analysis was the possibility that the significant t might be due to the very small variances encountered in this analysis. Therefore, it was decided to attempt to settle this question by another approach. If S's average Sum D with passing clusters was smaller than S's average Sum D with failing clusters, then the S was classified as a "passing" student. Conversely, if a S' average Sum D with failing clusters was smaller than their Sum D with passing clusters, then they were classified as "failing." This treatment generated a 4 - fold table in which the Chi Square was significant: ($X^2 = 4.834$; $p<.05$; $df=1$). See table 10. In this particular analysis, a formula for computing Chi Square without Yates' Correction was used.[2]

Third Post Hoc Analysis: The present writer attempted yet another analysis of the PIT data. (To aid the reader in following this analysis, assume the following hypothetical case: The subject is the first person in the B sub-sample, hence the designation of B-01.)

---

[2]The writer is indebted to Dr. Richard J. Anderson, Department of Psychology, University of Florida for suggesting this treatment without Yates' Correction. Dr. Anderson stated: "Yates' Correction is needed for small N, true, but for small N when the assumed count of discrete frequencies is suspect on the basis of continuity. As I interpret your judgment of how close these patterns are, this is a discrete and mutually exclusive judgment and not a breaking of a score continuum into intervals. Thus, I'd not use Yates' correction on theoretical grounds."
(Personal communication to the present writer, November 15, 1965)

TABLE 9.--A FREQUENCY DISTRIBUTION SHOWING THE NUMBER OF PASSING CLUSTERS ALL Ss IN GROUP B WERE "CLOSEST" TO, IN TERMS OF SUM D

Ss# 1-67 (Passing Ss)			Ss# 68-98 (Failing Ss)		
	Number of passing clusters a S was closest to	f		Number of passing clusters a S was closest to	f
1	0	0	1	0	0
2	0	0	2	0	0
3	~~||||~~ 11	7	3	~~||||~~ 1	6
4	~~||||~~ ~~||||~~ ~~||||~~ 11	17	4	~~||||~~ ~~||||~~ 1	11
5	~~||||~~ ~~||||~~ ~~||||~~ ~~||||~~ ~~||||~~ ~~||||~~ 111	33	5	~~||||~~ ~~||||~~ 111	13
6	~~||||~~ 1111	9	6	1	1
7	1	1	7	0	0
	Mean = 4.7 Variance = .7893 S.D. = .8878			Mean = 4.3 Variance = .6577 S.D = .8110	

F = .7893/.6577 = 1.198 (non-sign)(d.f. = 66/30)
t = 2.202 P. $<$ .05, d.f. = 96

	Cluster #	Sum D	Actual Ranks of Clusters by Sum D
Subject #B-01 (compared with all 14 clusters in terms of Sum D)	01	115	9
	02	122	12
	03	108	7
	04	110	8
	05	97	2
	06	130	14
	07	100	4
	08	102	6
	09	96	1
	10	117	10
	11	118	11
	12	99	3
	13	101	5
	14	127	13

It is possible to take the ranks of clusters obtained by ranking all Ss in sub-sample B in the above fashion, and assign a weighted value to each cluster. That cluster which had the smallest Sum D with a given S was given a value of 14, the cluster with the next smallest Sum D was given a value (or weight) of 13, and so on until all 14 clusters had been weighted for each subject. In the hypothetical case given above, cluster 09 would be given a weight of 14, cluster 05 a weight of 13, and cluster 12 would have been given a weight of 12, etc.

Then for each S, the values for passing clusters were added and the values for failing clusters were added. This gave each S a score (Sum of passing cluster ranks and sum of failing cluster ranks). Each category of Ss in sub-sample B (pass and fail) yielded a mean and a variance. A t Test was run comparing the pass and fail Ss on the passing clusters. The resulting t was significant ($t=2.86$; $df=96$; $p<.01$).

TABLE 10.--A CHI SQUARE CONTINGENCY TABLE SHOWING RESULTS OF CLASSIFYING 98 STUDENTS IN GROUP B ON THE BASIS OF WEIGHTED CLUSTERS

	Actual		
	Pass	Fail	Totals
Predicted Pass	58	21	79
Predicted Fail	9	10	19
Totals	67	31	98

$\chi^2 = 4.834$ $P < .05$ $df = 1$

It should be mentioned that all the post hoc analyses just cited, including the t test as well as the preceding Chi Square, ignored absolute differences existing in the Sum Ds of the Ss. In this sense, the present writer was using an ordinal scheme of measurement.

Fourth Post Hoc Analysis: A more powerful test of the ranking approach in the third post hoc analysis would be the Mann-Whitney U Test (36, pp. 116-127). Accordingly, the data were analyzed with the Mann-Whitney U technique. According to Siegal (36), in computing a Mann-Whitney U with a sample the size of sub-sample B, the distribution of U rapidly approaches the distribution of Z. Therefore, the obtained U was expressed in terms of Z. The value of Z resulting from this particular U test was 2.84 ($df=98$; $p < .01$).

In discussing the Mann-Thitney U test, Siegal has this to say: "This is one of the most powerful of the non-parametric tests, and it is a most useful alternative to the parametric t test when the

researcher wishes to avoid the t test's assumptions, or when the measurement in the research is weaker than interval scaling." (36, p. 116)

It would appear, from the post hoc analyses of the data, that the clusters obtained from the Lieberman-Chambers technique do tend to discriminate among achieving and non-achieving Ss in this sample. (The first two cluster analyses, conducted strictly in the fashion of the earlier Lieberman-Chambers study (24), did not support the hypothesis.) It is suggested that future research with the PIT, in predicting academic achievement, might find the post hoc analyses of this study useful.

Hypothesis II

> The margin of error in the prediction of academic achievement would be appreciably diminished by adding non-intellectual factors such as those contained in the Picture Identification Test and the Survey of Study Habits and Attitudes to a test of scholastic aptitude and a conventional measure of intelligence.

In order to employ the PIT in a multiple regression analysis, it was necessary to derive a score or value that could be used in computing a multiple R.

Passing and failing Ss in both sub-sample A and B were compared with each other on each of the 67 variables of the PIT. An examination of table 11 reveals the following set of conditions: a comparison of mean "sta-eight" scores for passing and failing Ss showed several which yielded significant t test results. However, whenever a significant t test difference on sub-sample A was looked for in sub-sample B, the significance failed to hold up. Conversely, those

TABLE 11.--A TABLE OF t DERIVED FROM DIFFERENCES BETWEEN MEANS AND STANDARD DEVIATIONS OF PASSING AND FAILING STUDENTS IN BOTH SUB-SAMPLE A AND SUB-SAMPLE B ON ATTITUDE, JUDGMENT, AND ASSOCIATION INDEX OF THE PIT.

Sub-sample A
Attitude

Variable	Passing Ss		Failing Ss		t
	Mean	S.D.	Mean	S.D.	
Abasement	4.0	2.07	4.9	1.81	2.07*
Achievement	4.6	2.07	4.0	1.81	1.28
Affiliation	5.0	1.81	4.6	2.14	0.80
Aggression	4.6	2.19	4.6	2.12	0.00
Autonomy	5.3	1.94	4.9	2.14	0.81
Blameavoidance	4.2	1.89	4.4	1.81	0.61
Counteraction	4.5	1.89	4.0	1.67	1.23
Deference	4.6	1.54	5.0	2.00	1.00
Defendance	4.9	1.94	4.3	2.21	1.19
Dominance	5.1	2.12	4.8	1.84	0.65
Exhibition	4.5	1.87	3.6	1.76	2.25*
Harmavoidance	4.2	2.04	4.8	2.40	1.18
Inferiority-avoidance	4.4	1.70	5.1	1.81	1.88
Nurturance	3.6	1.84	3.9	1.64	0.95
Order	4.4	1.76	4.4	2.14	0.04
Play	4.6	1.78	4.2	1.89	1.10
Rejection	4.8	2.19	3.8	2.02	2.13*
Sentience	4.2	2.12	4.8	1.84	1.66

TABLE 11.-- Continued

Sub-sample A
Attitude

Variable	Passing Ss Mean	S.D.	Failing Ss Mean	S.D.	t
Sex	4.8	1.92	4.7	2.09	0.20
Succorance	4.5	2.00	5.1	1.84	1.40
Understanding	3.8	1.89	4.0	2.09	0.56
Var score	4.6	1.94	4.6	1.73	0.62
Con score	4.3	1.97	3.8	1.73	1.37

*Indicates Significant t

Sub-sample A
Judgment

Variable	Passing Ss Mean	S.D.	Failing Ss Mean	S.D.	t
Abasement	4.3	1.94	4.9	1.78	1.32
Achievement	4.6	1.89	4.4	2.00	0.34
Affiliation	4.9	1.92	4.4	2.04	1.11
Aggression	4.3	1.78	4.2	2.04	0.30
Autonomy	3.9	1.73	4.1	2.25	0.47
Blameavoidance	4.3	1.78	3.7	2.25	1.11
Counteraction	4.4	1.64	3.9	2.25	1.09
Deference	4.3	2.02	4.1	2.04	0.48
Defendance	4.4	2.02	4.0	1.61	1.07

TABLE 11.--Continued

Sub-sample A
Judgment

Variable	Passing Ss Mean	S.D.	Failing Ss Mean	S.D.	t
Dominance	4.3	2.28	4.8	1.76	1.00
Exhibition	4.1	1.73	4.4	2.52	0.63
Harmavoidance	4.3	2.00	4.7	1.70	1.00
Inferiotity-avoidance	4.4	1.89	4.1	1.51	0.81
Nurturance	3.9	2.04	4.2	2.00	0.69
Order	3.7	1.48	4.1	1.81	1.08
Play	4.5	2.09	3.8	2.00	1.51
Rejection	5.0	1.78	4.6	1.70	1.03
Sentience	4.4	1.94	4.1	2.21	1.17
Sex	4.4	1.58	4.8	1.78	1.26
Succorance	4.4	1.92	4.2	1.76	0.49
Understanding	4.4	1.67	4.1	1.48	0.71
Sum J	4.1	1.87	3.8	1.78	0.73

Sub-sample A
Association Index

Variable	Passing Ss Mean	S.D.	Failing Ss Mean	S.D.	t
Abasement	4.5	1.94	4.7	1.84	0.62
Achievement	4.3	1.67	3.9	1.84	0.85
Affiliation	4.7	1.87	4.8	1.70	0.31

TABLE 11.--Continued

Sub-sample A
Association Index

Variable	Passing Ss		Failing Ss		t
	Mean	S.D.	Mean	S.D.	
Aggression	4.3	1.97	4.2	1.89	0.23
Autonomy	4.0	1.94	4.2	2.14	0.38
Blameavoidance	4.6	2.09	3.8	2.04	1.85
Counteraction	4.4	1.84	4.0	1.70	1.64
Deference	4.3	2.16	3.6	1.70	1.64
Defendance	4.2	2.23	4.0	1.81	0.43
Dominance	4.6	1.97	4.1	2.21	0.79
Exhibition	4.2	1.81	3.8	2.09	0.96
Harmavoidance	4.1	1.94	4.1	1.81	0.02
Inferiority-avoidance	4.6	1.94	4.0	2.21	1.21
Nurturance	4.5	2.07	3.9	1.97	1.36
Order	4.5	1.78	4.3	1.76	0.38
Play	4.5	2.14	3.5	1.84	2.30*
Rejection	5.0	1.70	4.5	2.00	1.30
Sentience	4.3	2.07	3.9	2.12	0.98
Sex	4.2	2.04	4.2	1.97	0.02
Succorance	4.2	2.09	3.8	2.21	0.92
Understanding	4.3	1.89	4.0	1.70	0.68
Sum AI	4.4	1.89	3.7	1.89	1.48

*Indicates Significant t

TABLE 11.--Continued

Sub-sample B
Attitude

Variable	Passing Ss Mean	S.D.	Failing Ss Mean	S.D.	t
Abasement	3.8	2.00	4.4	1.78	1.43
Achievement	4.4	1.67	4.4	2.21	0.02
Affiliation	5.0	1.70	4.7	1.70	0.79
Aggression	4.2	2.19	4.1	2.32	0.31
Autonomy	5.1	1.92	4.4	2.16	1.55
Blameavoidance	4.4	1.61	5.1	1.54	2.00*
Counteraction	4.6	1.92	4.1	2.34	1.14
Deference	4.7	1.94	4.3	1.67	1.15
Defendance	4.5	1.81	5.1	1.97	1.26
Dominance	4.2	1.84	4.8	2.00	1.25
Exhibition	4.5	1.84	4.6	2.21	0.26
Harmavoidance	4.4	1.92	5.3	1.61	2.30*
Inferiority-avoidance	4.7	1.78	4.5	2.25	0.38
Nurturance	4.7	2.14	3.9	1.76	1.83
Order	4.4	2.09	4.3	2.07	0.09
Play	4.6	1.92	4.0	1.94	1.40
Rejection	3.6	2.12	3.6	1.89	0.11
Sentience	4.8	1.84	4.3	2.25	0.92
Sex	4.5	1.92	5.4	2.02	1.98

TABLE 11.--Continued

Sub-sample B
Attitude

Variable	Passing Ss Mean	S.D.	Failing Ss Mean	S.D.	t
Succorance	4.7	1.76	4.5	1.84	0.29
Understanding	4.6	1.94	3.7	2.14	2.14*
Var	4.2	2.02	4.3	1.64	0.32
Con	4.0	1.92	4.3	1.84	0.57

*Indicates Significant t

Sub-sample B
Judgment

Variable	Passing Ss Mean	S.D.	Failing Ss Mean	S.D.	t
Abasement	4.3	1.97	4.3	2.04	0.13
Achievement	4.5	1.78	4.6	1.94	0.24
Affiliation	4.9	2.16	5.2	1.89	0.70
Aggression	4.5	1.94	3.9	1.70	1.58
Autonomy	4.4	2.04	4.1	2.21	0.50
Blameavoidance	4.4	1.73	3.7	2.17	1.59
Counteraction	4.4	1.97	4.1	1.92	0.65
Deference	3.7	1.78	4.0	1.70	0.69
Defendance	4.6	2.09	4.6	1.64	0.08
Dominance	4.9	1.92	3.8	1.78	2.71*

TABLE 11.--Continued

Sub-sample B
Judgment

Variable	Passing Ss Mean	S.D.	Failing Ss Mean	S.D.	t
Exhibition	4.2	1.81	4.5	2.09	0.64
Harmavoidance	4.9	1.97	4.5	2.38	0.84
Inferiority-avoidance	4.3	1.89	3.8	1.76	1.25
Nurturance	4.5	1.58	4.2	2.19	0.56
Order	4.4	2.04	3.4	1.89	2.20*
Play	4.7	1.92	4.3	1.94	0.79
Rejection	5.0	2.00	4.2	1.61	1.90
Sentience	4.4	2.12	3.4	2.00	2.28*
Sex	4.4	1.76	4.6	2.04	0.48
Succorance	4.7	1.89	4.0	2.14	1.54
Understanding	4.4	1.64	4.6	2.09	0.52
Sum J	4.5	1.76	3.7	2.04	1.80

*Indicates Significant t

Sub-sample B
Association Index

Variable	Passing Ss Mean	S.D.	Failing Ss Mean	S.D.	t
Abasement	4.7	2.04	4.2	1.67	1.20
Achievement	3.9	1.78	4.5	2.00	1.51
Affiliation	4.9	2.00	5.2	1.84	0.86

TABLE 11.--Continued

Sub-sample B
Association Index

Variable	Passing Ss Mean	S.D.	Failing Ss Mean	S.D.	t
Aggression	4.3	2.07	3.5	2.12	1.74
Autonomy	4.1	2.00	3.4	1.76	1.66
Blameavoidance	4.4	2.04	4.0	1.66	0.10
Counteraction	4.2	1.78	4.1	1.76	0.20
Deference	4.4	1.00	3.4	2.00	2.56*
Defendance	4.7	2.02	3.8	2.14	1.91
Dominance	4.7	1.70	3.8	1.84	2.40*
Exhibition	4.8	1.58	3.9	1.73	2.24*
Harmavoidance	4.8	2.07	4.2	1.94	1.18
Inferiority-avoidance	4.8	1.92	3.7	1.84	2.55*
Nurturance	4.5	2.17	3.1	1.84	0.86
Order	4.5	1.97	3.8	1.64	1.74
Play	5.0	1.81	4.6	1.84	0.90
Rejection	5.3	1.87	4.5	1.67	2.21*
Sentience	4.4	1.84	3.8	1.61	1.67
Sex	4.1	2.00	4.3	1.76	0.58
Succorance	4.9	1.76	3.6	1.54	3.53*
Understanding	4.2	1.78	3.7	2.07	1.09
Sum AI	4.7	1.97	3.4	2.00	2.98*

*Indicates Significant t

significant differences observed between "pass" and "fail" in sub-sample B failed to maintain their statistical significance when compared to sub-sample A. As a specific illustration of this situation: on the variable of Attitude, three significant t tests were observed between passing and failing Ss in sub-sample A, Abasement (t=2.07), Exhibition (t=2.25), and Rejection (t=2.13). An examination of that part of table 11 showing Attitude for sub-sample B shows that none of these differences was significant. Rather, for sub-sample B, significant differences were observed for Blameavoidance (t=2.00), Harmavoidance (t=2.39), and Understanding (t=2.04). None of these significant differences with sub-sample B held significant for sub-sample A. It was decided, on the basis of these results, to look elsewhere for a set of PIT values to use in computing a multiple R.

Chambers, Barger and Lieberman were able to show that various factors in the PIT were making a contribution of one third of the total D^2 of their discriminant function analysis for predicting college achievement in a University of Florida sample (9). Chambers, et al, called their weighted combination of PIT factors a "Drop-out Index." Based on its success in the earlier study with Florida students, it was decided to use this Drop-out Index in the present study. This Drop-out Index is composed by multiplying certain factors from the PIT by constant values. The factors making up the Drop-out Index and the constants by which these factors are multiplied may be seen in table 12.

TABLE 12.--FEMALE - VARIABLES WITH HIGHEST CONTRIBUTIONS TO D^2 FOR SURVIVOR-DROPOUT DISCRIMINANT FUNCTION ANALYSES (9)

Variable	Contribution to D^2
SCAT V	.36 (+) [a]
SCAT Q	.21 (+)
Def Att	.07 (+)
Aut Att	.05 (-) [b]
Agg Att	.05 (-)
Aff J	.04 (+)
Aff Att	.02 (+)
Sex J	.02 (+)
Har J	.02 (+)
Nur J	.02 (+)

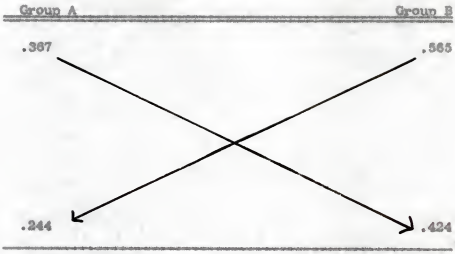
[a]High or positive score predicts survival
[b]Low or negative score predicts survival

In an earlier study of achievement at a junior college in Georgia, Lieberman and Chambers found evidence the Sum J and Sum AI were making contributions to predicting college grades (12). In particular, Chambers and Lieberman found that the drop-out in their Georgia Junior college study was particularly poor in his judgment of defendance and achievement needs. Accordingly, it was decided to use the Sum J and Sum AI in the computation of the multiple correlation.

Thus, the multiple regression analysis consisted of six inde-

pendent factors, three from the PIT: a Drop-out vs. Survivor Index, the Sum J, the Sum AI; and the Otis IQ; the SSHA; and the CQT. Following the method outlined in chapter II, a multiple correlation for both sub-sample A and sub-sample B were computed. A regression equation produced weights for each of the independent variables and the resulting regression weights applied to the variables in other sub-sample. See table 13.

TABLE 13.--A TABLE SHOWING THE MULTIPLE CORRELATION FOR GROUPS A AND B, AND THE CROSS VALIDATION RESULT.



The multiple R on sub-sample A was .367, which expanded to .424 when applied to sub-sample B. The multiple R on sub-sample B was .565, which shrank to .244 when applied to sub-sample A. While all the above correlations were statistically significant, they are not of such a magnitude as to support hypothesis II. Hypothesis II then, cannot be considered as confirmed by the results of this analysis.

TABLE 14.—A TABLE OF INTERCORRELATIONS - SUB-SAMPLE A

Variable	I.Q.	C.Q.T.	S.S.H.A.	SUM J	SUM A.I.	D.O.I.	G.P.A.
I.Q.	-	.443	.308	(-.077)	.059	.042	.274
C.Q.T.	-	-	.188	.131	.078	.045	.244
S.S.H.A.	-	-	-	(-.024)	.039	.049	.236
SUM J	-	-	-	-	.541	.118	.061
SUM A.I.	-	-	-	-	-	.063	.086
Drop-out Index	-	-	-	-	-	-	.099

TABLE 15.--A TABLE OF INTERCORRELATIONS - SUB-SAMPLE B

Variable	I.Q.	C.Q.T.	S.S.H.A.	SUM J	SUM A.I.	D.O.I.	G.P.A.
I.Q.	-	.546	.104	.125	.270	.112	.172
C.Q.T.	-	-	.235	.076	.186	.029	.426
S.S.H.A.	-	-	-	.129	.213	(-.164)	.348
SUM J	-	-	-	-	.517	.271	.203
SUM A.I.	-	-	-	-	-	.222	.344
Drop-out Index	-	-	-	-	-	-	(-.048)

CHAPTER IV

DISCUSSION

Hypothesis I

> Need-systems of achievers and non-achievers are unlike and these need-systems can be differentiated by a projective test, the Picture Identification Test.

The Similarity-Dissimilarity Ratio:

This technique appeared to have no capacity to discriminate between achievers and non-achievers in this study. Lieberman and Chambers (24) in their study of prisoners and trade school students, were able to use this method, together with the cluster analysis technique, to successfully discriminate among their two comparison groups, prisoners and trade school students. In their discussion, they referred to the old saying: "birds of a feather flock together." However, they were unable to divorce their results completely from one characteristic of their sample: The average number of years of education for the prisoners was 10.4. The trade school students had a mean educational level of 11.7. Because of the small variability within the groups, this difference of 1.3 years in average educational level was significant statistically. Lieberman and Chambers were unable to say whether this difference in educational level had any effect on the PIT results and the subsequent discrimination.

In the sample used for the present study, all subjects were identical in years of educational achievement. If, indeed, the observed educational difference between prisoners and trade school students in the Lieberman and Chambers study were a factor in the ability of the PIT to discriminate among them, this factor should not have been a factor in the present study of nurses and their achievement. Thus, it is possible that the failure of the Similarity-Dissimilarity Ratio to discriminate between achievers and non-achievers is due to the fact that the sample used in the present study had no differences in educational level. This, of course, raises the question of whether the PIT, in the Lieberman and Chambers study of prisoners and trade school students, was measuring educational differences rather than some kinds of personality variables.

The Cluster Analysis

This method, as with the Similarity-Dissimilarity Ratio discussed above, was taken from the Lieberman and Chambers (24) study of trade school students and prisoners. Similarly, it appeared effective in discriminating between prisoners and trade school students but it failed to discriminate among achievers and non-achievers in the present study.

The sample characteristic discussed, above, concerning the educational differences found in their sample by Lieberman and Chambers applies to this analysis as well. Lieberman and Chambers felt that the cluster analysis profiles offered the best means of exposing motivational dynamics within particular social groups

such as prisoners and trade school students. Chambers has suggested[1] that this might hold for groups such as achievers and non-achievers in college, as well. In discussing the results of their profile analysis, Lieberman and Chambers had this to say:

> "It is obvious that the cluster analysis technique, as applied in the present study, is suited to studies of other personality groupings. Such applications might be helpful in revealing the motivational dynamics of subtypes within groups which are classified on the basis of rather broadly defined symptomatic behavior, as is the case with prisoners and with many nosological categories." (24)

Unfortunately, the successful discrimination by cluster analysis observed by Lieberman and Chambers on their prisoner-trade school student sample may have been due to the admitted difference in educational achievement rather than any personality characteristic found in the PIT profiles. The lack of any educational achievement differences among sub-samples in the present study, together with the possibility that educational differences were relevant to the results obtained by Lieberman and Chambers, suggest that the unsuccessful application of the cluster analysis technique to the present study may be due to the fact that the PIT is sensitive to educational differences. A critical experiment to settle this question has yet to be designed and executed.

Subsequent Manipulation of Cluster Profile Data (The Post Hoc Analyses)

Following the computation of the Similarity-Dissimilarity Ratio, the initial cluster analyses (as per Lieberman and Chambers), and the computation of the multiple correlation coefficient, the present

---

[1]Personal communication to the present writer, October, 1962.

writer performed four post hoc analyses of the cluster data.

Two significant t tests, a significant Chi Square, and a significant U test resulted from these attempts. One caveat which is appropriate is to point out that all these analyses are based on an ordinal system of measurement and thus lack the rigor of interval or ratio scaling. However, the Mann-Whitney U test was specifically designed to test data fitting this kind of category. In discussing these results, it may be helpful to borrow an analogy from communication theory. It would seem that the PIT, as an instrument, may be picking up something related to achieving and non-achieving behavior. But there is too much "noise" in the system to permit unequivocal results. It is still a reasonable, but tantalizing, hypothesis that achievers and non-achievers, as many things being as equal as we can make them, are differentiated to some degree on the basis of their needs and values, as measured by the PIT.

Given, even the hopeful results that obtained from the use of ordinal data from the PIT, the present writer doubts that the PIT, in its present form, is of much practical value for college student selection. More research needs to be done with the PIT in order to understand its strengths and weaknesses. In particular, the question of the PIT's possible sensitivities to educational level needs to be investigated. A replication of the original prisoner-trade school study, with educational achievement controlled in the samples, would help clear this matter up.

The positive results obtained by the use of ordinal techniques (see this dissertation, Chapter III, pp. 37-44) tend to suggest that

the PIT has at least a theoretical contribution to make to the area of predicting academic achievement. These same results also tend to support Hypothesis I. However, these ordinal methods yield considerably transposed data which make it risky to stray too far from the data, in terms of predicting academic achievement. Thus, the PIT's contribution, in this study, is theoretical rather than practical.

Hypothesis II

> The margin or error in the prediction of academic achievement would be appreciably diminished by adding non-intellectual factors such as those contained in the Picture Identification Test and the Survey of Study Habits and Attitudes to a test of scholastic aptitude and a conventional measure of intelligence.

The Multiple Correlation

The results obtained from the multiple correlation analysis do not support Hypothesis II.

A multiple correlation design to predict academic achievement is a well established approach. Brown and Holtzman (5), Kim (22), Ahmann and Glock (1, 2), Nichols (31), and Roberts (33) are a few of the investigators who have used this kind of design in their attempts to predict academic achievement. The multiple correlation results of this study are generally poorer than all of the studies cited above.

Two possible sources of the poor performance of the multiple correlation attack in this study might be found in the nature and size of the sample. Sample size in the studies cited above ranged from 200 (22) to over 1,000 (31, 33). At the beginning of the

present study a sample of approximately 200 was considered adequate. Due to administrative problems beyond the control of the present writer, the number of subjects usable for the multiple correlation analysis actually dropped to 180. Hind-sight now seriously challenges the assumption that a sample of about 200 is adequate to investigate this question of academic achievement.

It could be argued that the manner in which the sample was divided into sub-samples (by odd-even assignment to either sub-sample A or B after the subjects were ordered on the basis of grades) was responsible for the unstable results. However, F tests and t tests were run to see if any unusual distribution resulted and none could be observed (see this dissertation, table 2 and 3). In spite of the results shown in tables 2 and 3, it would appear that the sample, in general, and sub-sample B in particular, seemed to be loaded with test score idiosyncrasies. The result was a reversal of usual factor loadings in the regression equation for sub-sample B. Scattergrams were made for each sub-sample with IQ, College Qualification Tests (CQT), and Grade Point Average (GPA) as variables. What the scattergrams showed was several cases of students with "high" IQs making "low" grades, and vice versa. To pursue the matter of sample idiosyncracy further, partial correlations were computed, using a formula from Walker and Lev, (42, p. 342). The results were as follows:

Sub-sample A

Correlation of IQ with GPA, holding CQT constant: +.19
Correlation of CQT with GPA, holding IQ constant: +.14

Sub-sample B

Correlation of IQ with GPA, holding CQT constant: -.08
Correlation of CQT with GPA, holding IQ constant: +.40

These results would seem to indicate that the relationships between the instruments and the criterion in sub-sample B were peculiar, to say the least. The result was a reversal of factor loadings when a cross-validation was attempted. A much larger sample, on the order of one thousand, might have tended to dissipate the sample peculiarity experienced in the present study.

Because of the problems encountered with the sample in the multiple correlation analysis, it is impossible to evaluate the contribution made, or not made, by the PIT to this kind of approach.

Other General Considerations

The problem of tapping variables related to presently hidden aspects of college achievement:

The present writer, as one of the faculty teaching the students who were subjects for this study, recalls being asked by many of them for counsel on career and educational goals. One student comes to mind as a possible example or explanation of some of the contradictory results obtained, particularly in the multiple correlation. The young lady in question had an Otis IQ of 130. Her divorced mother was a very successful secretary but had cherished the idea of being a nurse all her life. Since she could not achieve this goal in her lifetime, she packed her only daughter, a subject in this study, off to Monroe Community College to become a nurse. The daughter told the present writer she detested nursing and outlined her feelings for nursing in vivid detail. Her stated academic interests lay in the

field of English Literature. Her grades in English were excellent but her overall first semester GPA was 1.9. The present writer is unable to say how many cases similar to this could have been found in this sample. The present writer counseled nursing students for three years in the course of usual duties as a faculty member at Monroe Community College. The clinical impression gained from many of these students is that a significant minority had the aptitude, on paper, but lacked a clear-cut commitment to the career of nursing. Frequently, these students appeared to be attempting to please their respective families by enrolling in the nursing curriculum.

It has been suggested to the present writer that the PIT should be capable of measuring commitment as a personality variable. In reflecting on this, the present writer has these thoughts:

Could not the word "commitment," as used here, also be synonymous with the word "motivation?" The measurement or assessment of motivation has always seemed a kind of statistical "Holy Grail" to be pursued by psychologists without much success.

Another thought occurrs to the present writer, perhaps the "commited" college student has some characteristic pattern on the PIT such that his behavior in college could be inferred from a PIT profile. This would be analogous to certain inferences made from a profile on a person who has taken the MMPI. If the reader will substitute the word "achiever" or "non-achiever" for the word "commited," he will then have an approximate re-phrasing of Hypothesis I in this study. In this sense, a personality test, organized

with the rationale of the PIT, should, in some way, tap commitment.

Other factors apparently not sufficiently controlled nor dealt with in this study should also be considered. The present writer questions the adequacy of a criterion that is a single semester's grades. The single semester grade criterion involves several risks which could spuriously lower academic prediction. Illness or financial reverses in the family of a subject, temporary shifts in the physical and/or mental health of a subject during the semester or term, and capricious grading procedures by a small segment of the faculty are all factors which could obscure observed results in this kind of study. A design which called for data which matured over two to three years would tend to see such factors cancelled out.

A Criticism of This Type of Study

At this point, the criticisms and observations of Joshua Fishman should be considered (34). Fishman has pointed out (1) that a study such as the present one places too much reliance on "intellective" criteria, to use his term. (2) He points out that designs involving "non-intellective" predictors have not done well in the past. He suggests that the non-intellective predictor has not done very well because we have yet to produce the "better personality test," to use his words. (3) Fishman further observes that high school grades and aptitude and intelligence tests are already saturated with non-intellective factors. Thus, personality tests make little, if any, contribution to the prediction of academic success.

It would seem that Fishman is advocating a longitudinal, rather

than cross-sectional, approach to assessing the factors that make up achievement. Another way of expressing this would be to refer to the concept of immediate versus ultimate criteria. A criterion consisting of one, or even several, semester's grades might be considered an immediate criterion. Whereas such factors as passing the state board exams in nursing, being accorded honors and recognition by fellow nurses, rising to higher levels of specialization, achieving administrative status, etc. might be some examples of ultimate criteria. Fishman has effectively made a case for weighing diverse kinds of criteria over a longer period of time. Roberts (33) and Nichols (31) have attempted to do this. Fishman's observations must stand as well taken criticisms of the present study.

As Fishman has pointed out, our attempts to use personality tests in predicting academic achievement have not been successful. His suggestion that aptitude and intelligence tests are clouded with non-intellective factors is provocative: it remains an open and controversial question. The present study sheds no light on this matter, but the writer feels that it needs serious investigation.

Fishman concludes by proposing a moratorium on testing and prediction until we can re-think the problem and develop better theoretical formulations for our predictive studies. This is an appealing idea but the present writer doubts it will come to pass, however. The pressures are building up to push us in quite the opposite direction. What is more likely is that researchers will adapt Fishman's hypotheses and proceed to test them. This is already being done in the work of Roberts (33) and Nichols (31).

It remains for the present writer to criticize his own study. This study should have been planned to include about three years to execute. Three years would be a minimum to allow the use, in the criterion (or criteria), of all college grades connected with the nursing training, the grade on the state board examination, and the evaluation of each subject made by the faculty teaching the clinical nursing courses.

This study was seriously hampered by the small size of the sample. A much larger sample (500 to 1,000 subjects) might have avoided the problems encountered in the statistical analysis.

CHAPTER V

SUMMARY

Rationale

This dissertation had, as its rationale, the belief that a projective test with objective scoring features (The Picture Identification Test) could be used to improve the procedures for selecting college students. This projective test is based on the theory of the Murray Need-Press system (30). Murray states that "needs" refers to the internal organization of values (i.e. likes, dislikes, wishes, and motives) of the individual. "Press" refers to a pattern of external pressures exerted by the environment.

The present writer held the opinion that a test based on such a premise as that underlying the Picture Identification Test (PIT) would contribute vital missing elements to the prediction of academic success. Accordingly, two hypotheses were constructed to test the ability of the PIT to add to the prediction of college achievement.

The Hypotheses

Hypothesis I: Need-systems of achievers and non-achievers are unlike and these need-systems can be differentiated by a projective test, the Picture Identification Test.

Hypothesis II: The margin of error in the prediction of academic achievement would be appreciably diminished by adding non-intellectual factors such as those contained in the Picture Identification Test and the Survey of Study Habits and Attitudes to a test of scholastic aptitude and a conventional measure of intelligence.

The Design

The first semester Grade Point Average (GPA) was selected as the dependent variable in this study.

Intelligence, as measured by the Otis IQ test; academic aptitude, as measured by the College Qualification Tests; study habits, as measured by the Brown and Holtzman Survey of Study Habits and Attitudes; and elements of personality need-press, as measured by the Picture Identification Test, were chosen as the independent variables and instruments, respectively.

The sample for testing Hypothesis I consisted of 196 female, freshman nursing students at a two year community college in the state of New York. The sample for testing Hypothesis II consisted of 180 female, freshman nursing students from the same community college. All 180 cases in the sample for Hypothesis II were included in the 196 cases used to test Hypothesis I.

Hypothesis I was tested by the use of a critical ratio and a cluster analysis methodology. Hypothesis II was tested by a multiple correlation and cross validation of the multiple correlation.

The procedure called for all subjects to be tested during the Fall Orientation Week at Monroe Community College, September, 1964. Data gathering was not complete until November, 1964 to allow for make-up testing. All tests, except the PIT, were scored at Monroe Community College. The PIT was scored at the Charles L. Mix Memorial Fund, Inc., Americus, Georgia

Results

Analysis of the data by a Similarity-Dissimilarity Ratio did not

confirm Hypothesis I. Analysis of the data by a proposed cluster analysis method also failed to confirm the hypothesis. A post hoc methodology did show support for Hypothesis I but the data were considerably transposed and are not used here to support the hypothesis. This post hoc analysis offered some theoretical support for the validity of the Picture Identification Test but the practical value of the instrument and the technique is not clear.

Analysis of the data for Hypothesis II by a multiple correlation technique failed to support the hypothesis. The sample proved to contain peculiarities which would have obscured any result.

Discussion

Comparison of results in the present study, with results in another kind of study with the PIT, which used the Similarity-Dissimilarity Ratio and the Cluster Analysis techniques, raise questions as to whether the PIT is sensitive to educational differences and is measuring these rather than personality differences. A critical experiment to settle this issue needs to be executed.

Subsequent manipulation of the cluster profile data by a post hoc analysis did show the PIT apparently discriminating among achievers and non-achievers. This was accomplished with the use of rather transposed data. However, the post hoc analysis tended to support the PIT on a theoretical basis.

The multiple correlation analysis of the data failed to support Hypothesis II. Serious problems were encountered concerning both the criterion and the sample. Both were judged to be inadequate.

With respect to the sample, factor loadings usually obtained from a regression equation were reversed. The result was an abnormal shrinkage in the cross-validation. The multiple correlations were positive and significant but failed to be high enough to fulfill the requirements of Hypothesis II.

Individual cases were discussed with an eye to considering some of the problems of tapping variables which seem to remain hidden from view. The question was raised as to whether the PIT, or any other personality test, could be considered to measure "commitment" or "motivation."

Fishman (34) was quoted as having proposed (a) the use of ultimate, rather than immediate, criteria (b) an investigation of our present aptitude and intelligence instruments to see if they are not already loaded with "non-intellectual" factors and are thereby confounding the use of "personality" tests in academic prediction (c) a moratorium on testing for academic prediction until the theoretical formulations can be more fully worked out.

APPENDIX A

Cluster Analysis Technique Employed in Study Entitled Differences Between Prisoners and Trade School Students on the Picture Identification Test

Lewis R. Lieberman and Jay L. Chambers
The Charles L. Mix Memorial Fund, Inc., Americus, Georgia

The general objective of the cluster analysis is to group together subjects whose scores are alike. In the particular study for which the technique was devised, there were 100 subjects representing two groups of 50 each. Each group of 50 was cluster analyzed separately. Within each group, a cluster was defined as a collection of three or more Ss, all of whose scores were similar to all of the others, with the additional condition that no S could be in more than one cluster. Two Ss were considered to have similar scores if some measure of relationship or similarity between them was below (or above) some cut-off point. In the present study the measure of relationship was a score based on differences and thus the smaller the score between a pair of Ss the more similar were their scores.

Each S received 67 scores on the PIT. On each of these scores, a pair of Ss can be compared and the difference in their scores calculated. Since each of the scores was on an eight point stan-

dard score scale, each difference could range from zero to seven. The absolute sum of the 67 differences so calculated represented the Sum D score between a pair of Ss.

The Sum D scores for each S with every other S in the entire group of 100 Ss was computed. For each of 100 Ss there were 99 such scores. These 9900 scores represented each score twice, so that there were really only 4550 unique Sum D scores. From a frequency distribution it was determined that the lowest ten percent of these scores were below 120 which was taken as a cut-off point. If any two Ss had a Sum D score of 119 or below, the two Ss were regarded as similar.

It should be pointed out that since only Ss within the same group of 50 could belong to the same cluster a Sum D score of 119 or less between subjects in different groups (prisoners and students in the present study) were eliminated for purposes of the analysis.

The specific procedure for isolating the cluster is illustrated in the worked example below. In general, the procedures are as follows: (1) List for each S, all those Ss with whom he is similar (has Sum D score of less than 120) and choose for the possible "center" of a cluster that S with the largest list. (2) From the Ss on the list of the chosen S, choose those which will make the largest cluster. These Ss represent a cluster. (3) Repeat step (1) without the Ss used in the cluster extracted.

Fictitious Example.

In the example to be considered, there are nine Ss, A through I.

The Sum D scores for these Ss are shown in the matrix below. Note that the scores are entered only for Ss considered to be similar (scores of 119 or less). The diagonal is left blank: this is a convenience since the diagonal scores (all zero by definition) are of no import in the analysis.

TABLE A

Matrix of Sum D Scores for Nine Subjects

	A	B	C	D	E	F	G	H	I	No. of scores
A			97			110	113	118	109	5
B				116	108			117	107	4
C	97					114	109	115		4
D		115			111				100	3
E		108		111				116		3
F	110		114				119			3
G	113		109			119				3
H	118	117	115	116						4
I	109	107		100						3
No. of scores	5	4	4	3	3	3	3	4	3	

For step (1) we can see that Subject A has the largest number of scores in the matrix. We can therefore try to build the first cluster around him. A handy way to do this is to make a smaller matrix including just those Ss with whom A has a score of less than 120 and using checkmarks or asterisks to indicate presence of such scores.

TABLE B

Matrix for Subject A

	A	C	F	G	H	I	No. of scores
A		*	*	*	*	*	5
C	*		*	*	*		4
F	*	*		*			3
G	*	*	*				3
H	*	*					2
I	*						1
No. of scores	5	4	3	3	2	1	

We observe from this matrix that our best chance of getting the largest cluster is to include A and C because C has the largest number of similarities (second only to A who was chosen because he had the largest number of scores.) Applying the same rule, our next choice would be either F or G (they each have 3 scores) or better both F and G. Starting with F we have to test to see whether C and F are similar (we know A and F are similar by the way the matrix was constructed). We observe at the point where C and F intersect there is an asterisk, so we know that at least A, C, and F could be a cluster. Similarly for G we note that C and G are similar (there is an asterisk at the intersection of A and G in the matrix). If there is an asterisk where F and G intersect, then the cluster would be A, C, F, and G. There is an asterisk there so our first cluster is composed of A, C, F, and G. We may note that in this particular case, it is not possible for either of the other Gs

to be a member of the cluster. H has two asterisks and I has only one, making it impossible for either of these to join a cluster which already has four members.

It should be noted that A, C, and H form a cluster (there are asterisks for AC, AH, and CH), but the rule is to choose the largest possible cluster, in this case A, C, F, and G.

Next, we would eliminate the subjects already chosen and pick a possible "center" for our next cluster. The subject who now has the largest list of Ss with similar scores is subject B. A matrix for B includes all the remaining Ss and is reproduced below.

TABLE C

Matrix for Subject B

	B	D	E	H	I	No. of scores
B		*	*	*	*	4
D	*		*		*	3
E	*	*		*		3
H	*		*			2
I	*	*				2
No. of scores	4	3	3	2	2	

Our best candidates for a cluster here are B, D, and E. BD and BE we know have asterisks (since the matrix was made for B) and if DE has an asterisk then B, D and E would represent a cluster. We see that it does. Neither H nor I can be added to this cluster, but we see that B, H, E and B, D, and I, also represent possible clusters. We thus have three possible clusters all of equal size.

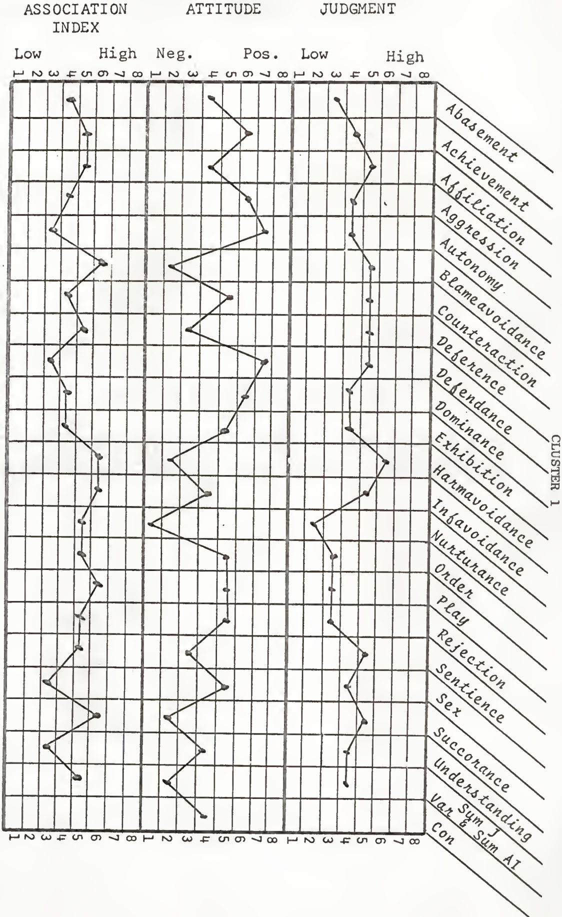
RULE FOR CHOOSING BETWEEN CLUSTERS OF EQUAL SIZE.

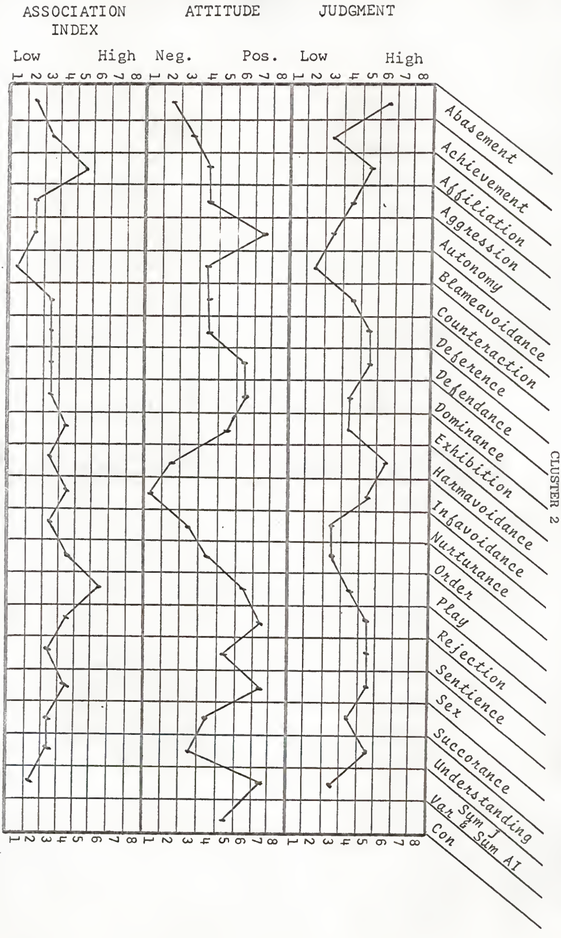
In the event that two or more clusters of equal size contain some common Ss, choose that cluster which has the smallest combined Sum D score. Referring back to the original table now, we see that for cluster B, D and E this sum would be: the Sum D of BD (115) plus the Sum D of BE (108) plus the Sum D of DE (111). The total of these sums is 334. Similarly for B, H, and E, the combined Sum D scores are 117 + 108 + 116 = 341. And for B, D and I the combined Sum D scores are 115 + 107 + 100 = 322. The lowest combined score goes with the last cluster (B, D, and I) which would thus form Cluster II.

This exhausts the clusters in the original group of nine Ss since there are only two Ss left and even if they had a Sum D score of less than 120, two Ss are too small for a cluster, by definition.

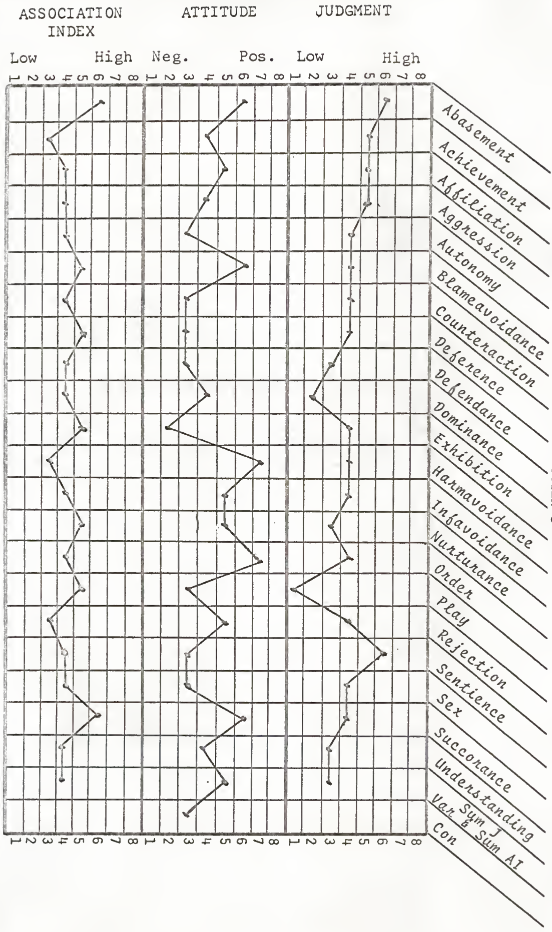
Ties can arise in two places in the procedure outlined. (1) There can be a tie in choosing the S which is to be the "center" for a cluster. (2) There can be a tie in the combined Sum D scores for two clusters of equal size. In both the cases, we recommend some chance procedure for making a selection. In actual practice situation (2) has never arisen although situation (1) has, and we have made arbitrary selections. It would probably be better in situation (1) to take each candidate in turn and examine the best cluster of each candidate and choose among these by employing the usual rules: choose the largest cluster, or, in cases of equal size, choose the cluster with the smallest combined Sum D score.

APPENDIX B

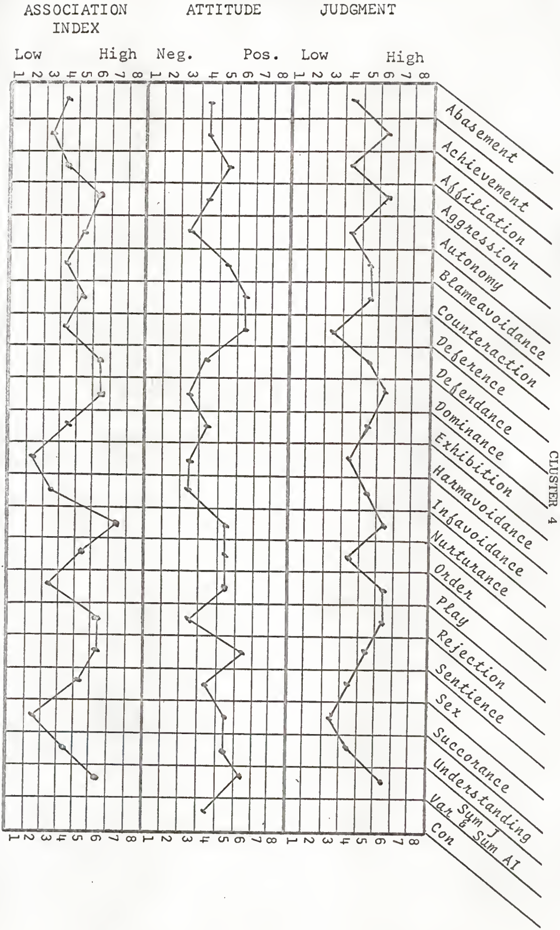

ASSOCIATION INDEX
ATTITUDE
JUDGMENT
Low
High
Neg.
Pos.
Low
High
1 2 3 4 5 6 7 8
1 2 3 4 5 6 7 8
1 2 3 4 5 6 7 8
Abasement
Achievement
Affiliation
Aggression
Autonomy
Blameavoidance
Counteraction
Deference
Defendance
Dominance
Exhibition
Harmavoidance
Infavoidance
Nurturance
Order
Play
Rejection
Sentience
Sex
Succorance
Understanding
Var Sum J
& Sum AI
Con
CLUSTER 1



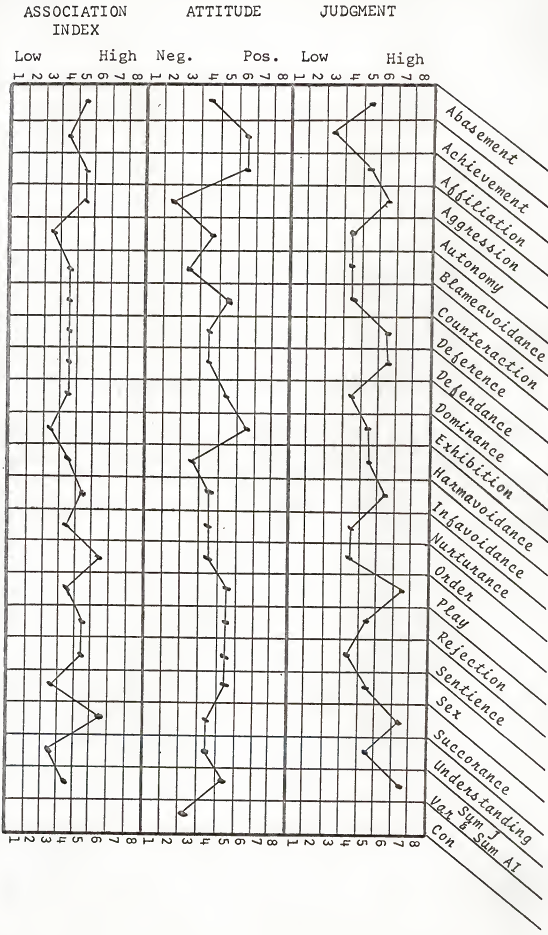
ASSOCIATION INDEX
ATTITUDE
JUDGMENT
Low
High
Neg.
Pos.
Low
High
Abasement
Achievement
Affiliation
Aggression
Autonomy
Blameavoidance
Counteraction
Deference
Defendance
Dominance
Exhibition
Harmavoidance
Infavoidance
Nurturance
Order
Play
Rejection
Sentience
Sex
Succorance
Understanding
Var Sum J
& Sum AI
Con
CLUSTER 2


ASSOCIATION INDEX
ATTITUDE
JUDGMENT
Low
High
Neg.
Pos.
Low
High
1 2 3 4 5 6 7 8 1 2 3 4 5 6 7 8 1 2 3 4 5 6 7 8
Abasement
Achievement
Affiliation
Aggression
Autonomy
Blameavoidance
Counteraction
Deference
Defendance
Dominance
Exhibition
Harmavoidance
Infavoidance
Nurturance
Order
Play
Rejection
Sentience
Sex
Succorance
Understanding
Var Sum J
& Sum AI
Con

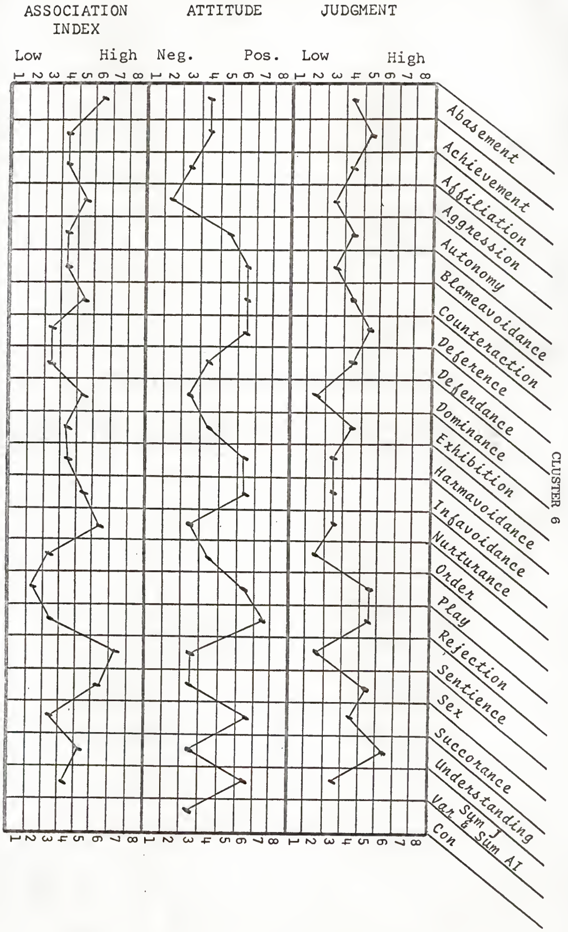
CLUSTER 3

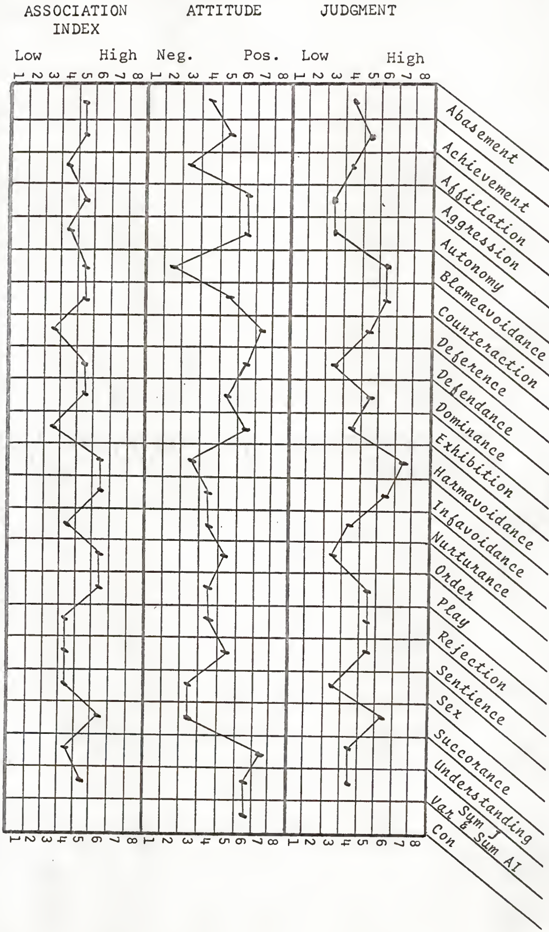


ASSOCIATION INDEX
ATTITUDE
JUDGMENT
Low
High
Neg.
Pos.
Low
High
1 2 3 4 5 6 7 8 1 2 3 4 5 6 7 8 1 2 3 4 5 6 7 8
Abasement
Achievement
Affiliation
Aggression
Autonomy
Blameavoidance
Counteraction
Deference
Defendance
Dominance
Exhibition
Harmavoidance
Infavoidance
Nurturance
Order
Play
Rejection
Sentience
Sex
Succorance
Understanding
Var Sum J
& Sum AI
Con
CLUSTER 4

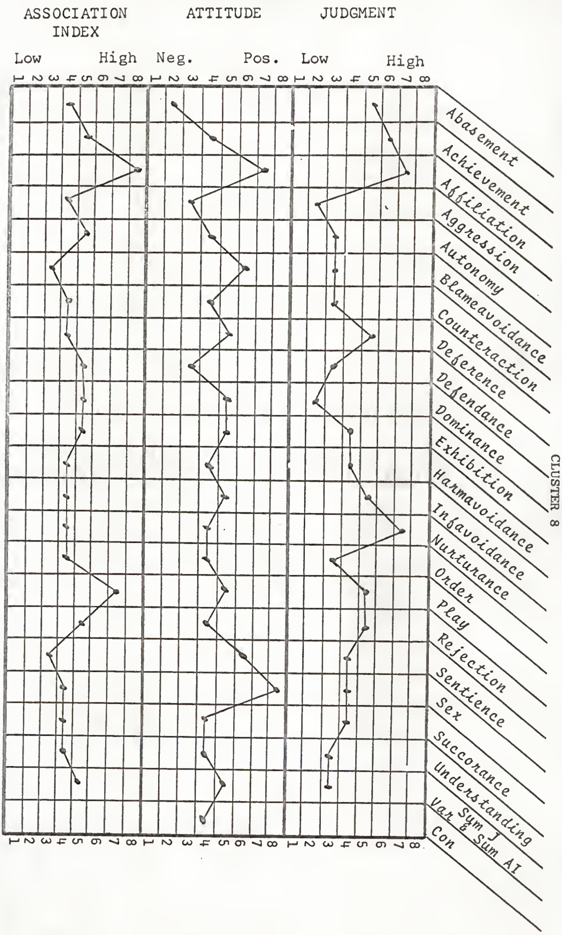

ASSOCIATION INDEX
ATTITUDE
JUDGMENT
Low
High
Neg.
Pos.
Low
High
Abasement
Achievement
Affiliation
Aggression
Autonomy
Blameavoidance
Counteraction
Deference
Defendance
Dominance
Exhibition
Harmavoidance
Infavoidance
Nurturance
Order
Play
Rejection
Sentience
Sex
Succorance
Understanding
Var Sum J
& Sum AI
Con

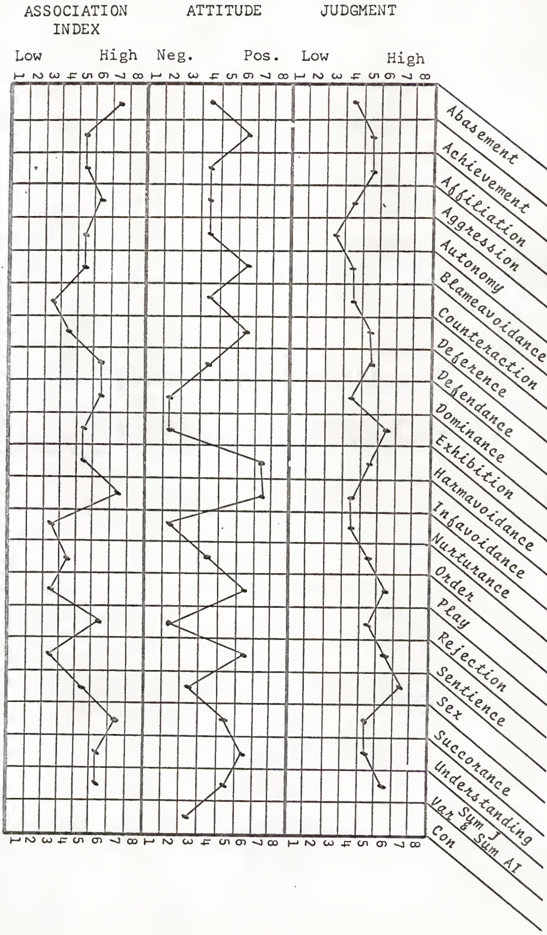
CLUSTER 5


ASSOCIATION INDEX
ATTITUDE
JUDGMENT
Low
High
Neg.
Pos.
Low
High
Abasement
Achievement
Affiliation
Aggression
Autonomy
Blameavoidance
Counteraction
Deference
Defendance
Dominance
Exhibition
Harmavoidance
Infavoidance
Nurturance
Order
Play
Rejection
Sentience
Sex
Succorance
Understanding
Var Sum J
Var & Sum AI
Con
CLUSTER 6

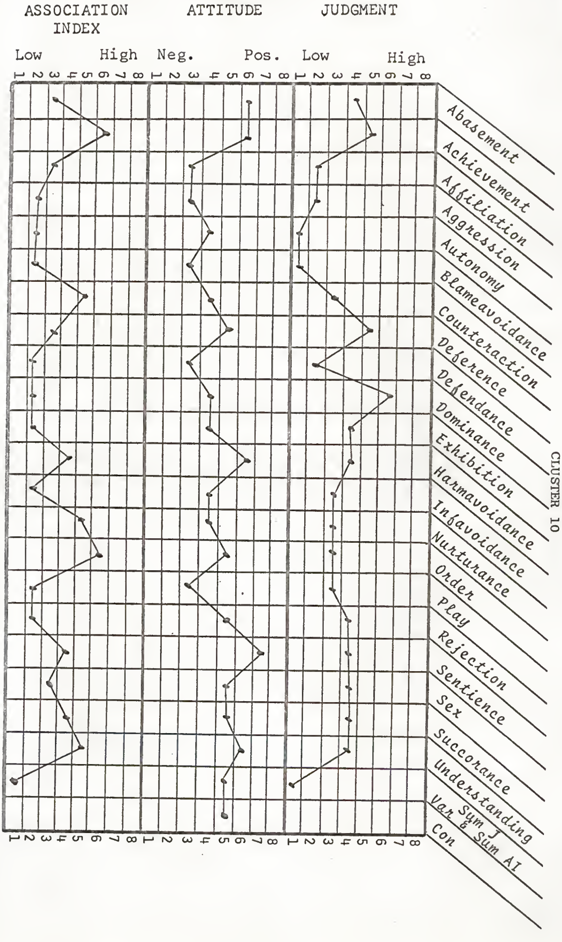

ASSOCIATION INDEX
ATTITUDE
JUDGMENT
Low
High
Neg.
Pos.
Low
High
1 2 3 4 5 6 7 8 1 2 3 4 5 6 7 8 1 2 3 4 5 6 7 8
Abasement
Achievement
Affiliation
Aggression
Autonomy
Blameavoidance
Counteraction
Deference
Defendance
Dominance
Exhibition
Harmavoidance
Infavoidance
Nurturance
Order
Play
Rejection
Sentience
Sex
Succorance
Understanding
Var Sum J
Var & Sum AI
Con

CLUSTER 7

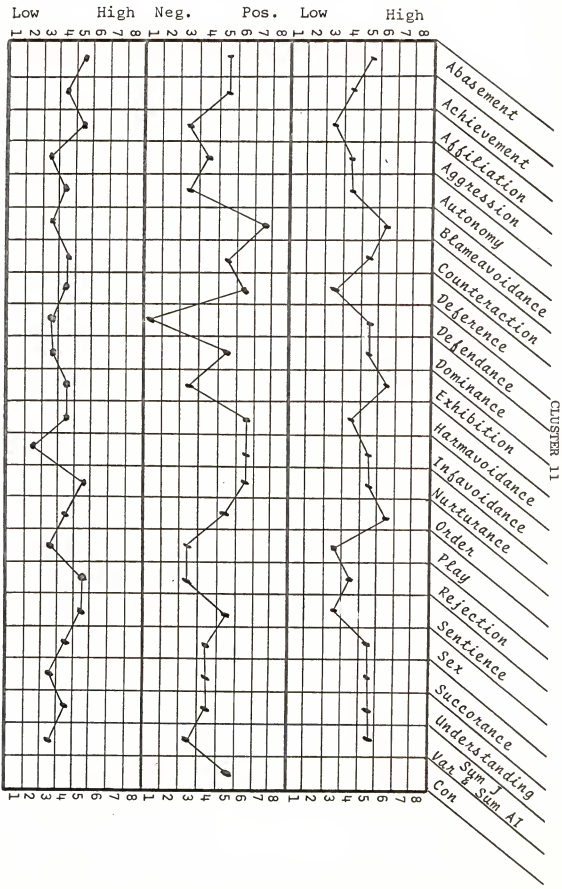

ASSOCIATION INDEX
ATTITUDE
JUDGMENT
Low
High
Neg.
Pos.
Low
High
1 2 3 4 5 6 7 8
Abasement
Achievement
Affiliation
Aggression
Autonomy
Blameavoidance
Counteraction
Deference
Defendance
Dominance
Exhibition
Harmavoidance
Infavoidance
Nurturance
Order
Play
Rejection
Sentience
Sex
Succorance
Understanding
Var Sum J
& Sum AI
Con
CLUSTER 8

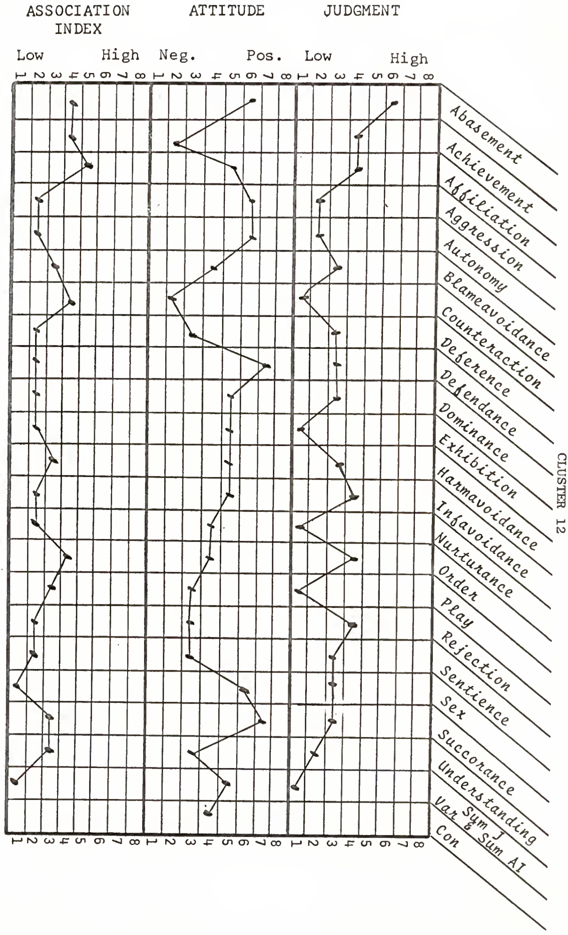

ASSOCIATION INDEX
ATTITUDE
JUDGMENT
Low
High
Neg.
Pos.
Low
High
1 2 3 4 5 6 7 8 1 2 3 4 5 6 7 8 1 2 3 4 5 6 7 8
Abasement
Achievement
Affiliation
Aggression
Autonomy
Blameavoidance
Counteraction
Deference
Defendance
Dominance
Exhibition
Harmavoidance
Infavoidance
Nurturance
Order
Play
Rejection
Sentience
Sex
Succorance
Understanding
Var Sum J
& Sum AI
Con

CLUSTER 9

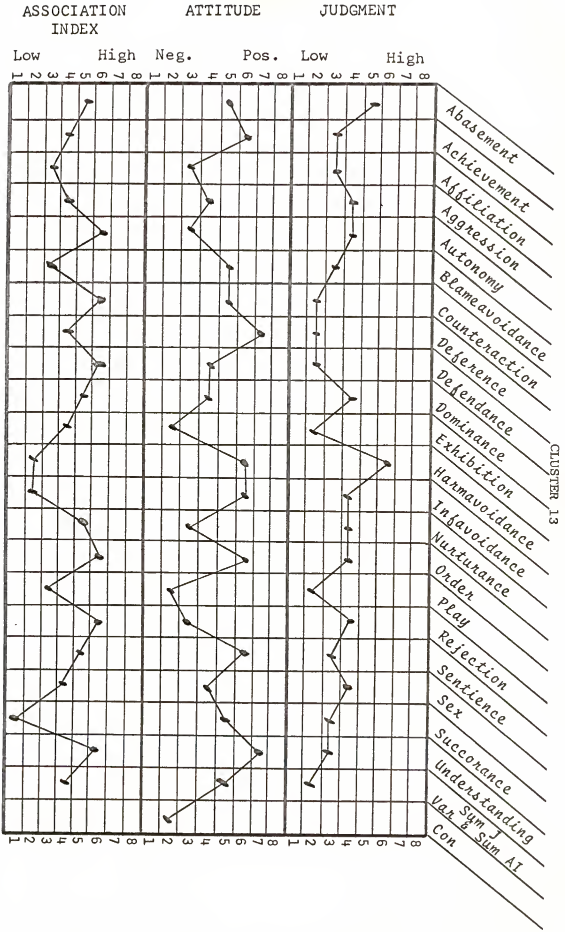

ASSOCIATION INDEX
ATTITUDE
JUDGMENT
Low
High
Neg.
Pos.
Low
High
1 2 3 4 5 6 7 8
Abasement
Achievement
Affiliation
Aggression
Autonomy
Blameavoidance
Counteraction
Deference
Defendance
Dominance
Exhibition
Harmavoidance
Infavoidance
Nurturance
Order
Play
Rejection
Sentience
Sex
Succorance
Understanding
Var Sum J
& Sum AI
Con

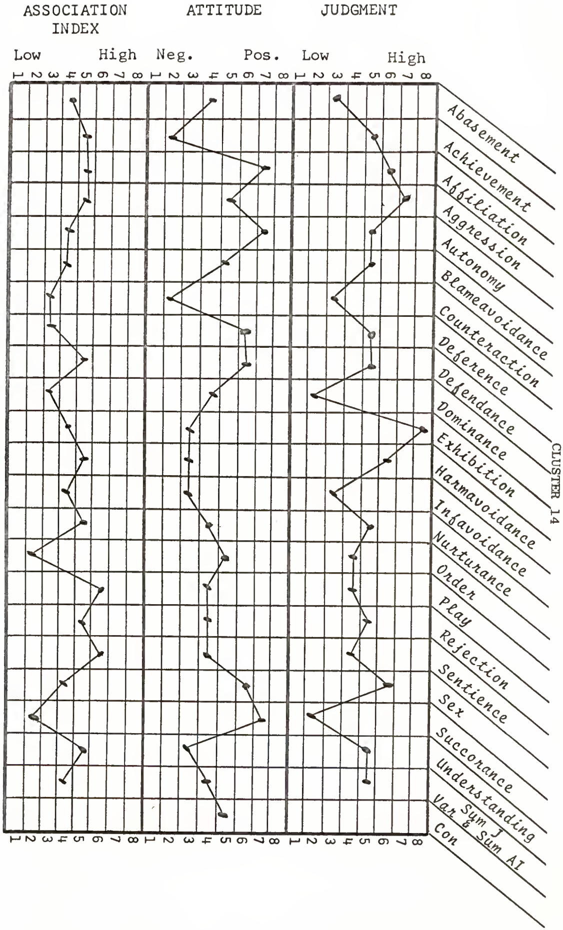
CLUSTER 10


ASSOCIATION INDEX
Low
High
ATTITUDE
Neg.
Pos.
JUDGMENT
Low
High
1 2 3 4 5 6 7 8
Abasement
Achievement
Affiliation
Aggression
Autonomy
Blameavoidance
Counteraction
Deference
Dependance
Dominance
Exhibition
Harmavoidance
Infavoidance
Nurturance
Order
Play
Rejection
Sentience
Sex
Succorance
Understanding
Sim J
Var & Sim AI
Con
CLUSTER 11


ASSOCIATION INDEX
ATTITUDE
JUDGMENT
Low
High
Neg.
Pos.
Low
High
1 2 3 4 5 6 7 8
Abasement
Achievement
Affiliation
Aggression
Autonomy
Blameavoidance
Counteraction
Deference
Defendance
Dominance
Exhibition
Harmavoidance
Infavoidance
Nurturance
Order
Play
Rejection
Sentience
Sex
Succorance
Understanding
Var Sum J
& Sum AI
Con

CLUSTER 12


ASSOCIATION INDEX
ATTITUDE
JUDGMENT
Low
High
Neg.
Pos.
Low
High
1 2 3 4 5 6 7 8 1 2 3 4 5 6 7 8 1 2 3 4 5 6 7 8
Abasement
Achievement
Affiliation
Aggression
Autonomy
Blameavoidance
Counteraction
Deference
Defendance
Dominance
Exhibition
Harmavoidance
Infavoidance
Nurturance
Order
Play
Rejection
Sentience
Sex
Succorance
Understanding
Var Sum J
& Sum AI
Con
CLUSTER 13



ASSOCIATION INDEX
ATTITUDE
JUDGMENT
Low
High
Neg.
Pos.
Low
High
1 2 3 4 5 6 7 8 1 2 3 4 5 6 7 8 1 2 3 4 5 6 7 8
Abasement
Achievement
Affiliation
Aggression
Autonomy
Blameavoidance
Counteraction
Deference
Defendance
Dominance
Exhibition
Harmavoidance
Infavoidance
Nurturance
Order
Play
Rejection
Sentience
Sex
Succorance
Understanding
Var Sum J
& Sum AI
Con
CLUSTER 14

BIBLIOGRAPHY

1. Ahmann, J. L. and Glock, M. D. "The Utility of Study Habits and Attitudes Inventory in a College Reading Program." J. of Ed. Res., 51: 297-303 D'57.

2. Ahmann, J. L., Glock, M. D. and Smith, W. L. "Predicting Academic Success in College by Means of a Study Habits and Attitudes Inventory." Ed. and Psychological Meas., 18: 853-857 W'58.

3. Altus, W. D. "A College Achiever and Non-achiever Scale for the MMPI." J. of Applied Psych., 32: 385-397, 1948.

4. Brown, W. F. and Holtzman, H. W. "A Study-attitudes Questionnaire for Predicting Academic Success." J. Educ. Psych., 46: 75-84, 1955.

5. Brown, W. F. and Holtzman, H. W. "A Survey of Study Habits and Attitudes." Pers. and Guid. J. 35: 214-218, Dec. 56.

6. Buros, O. K. (Editor) The Fifth Mental Measurements Yearbook, Highland Park, N. J., Gryphon Press, .959.

7. Chambers, J. L. unpub. reliability study of PIT, 1961.

8. Chambers, J. L. "Trait Judgment of Photographs and Adjustment of College Students." J. of Consulting Psych. 25: 433-435, 1961.

9. Chambers, J. L. Barger, Ben, and Lieberman, L. R. "Need Patterns and Abilities of College Dropouts." Ed. and Psych. Meas., 25: 509-516, 1965.

10. Chambers, J. L. and Broussard, L. J. "Need-attitudes of Normal and Paranoid Schizophrenic Males." J. of Clin. Psych., 3: 233-237, 1960.

11. Chambers, J. L. and Broussard, L. J. "The Role of Need-attitudes in Adjustment." J. of Clinical Psych., 4: 383-387, 1960.

12. Chambers, J. L. and Lieberman, L. R. "Personality Factors Relating to College Adjustment and Achievement," Unpubl. paper presented to the Georgia Assoc., of Jr. Colleges, Annual Meeting, Georgia Southwestern College, 1961.

13. Chambers, J. L. and Lieberman, L. R. "Variability of Normal and Maladjusted Groups in Attributing Needs to Best Liked and Least Liked People." J. of Clin. Psych., 18: 98-101, 1962.

14. Chamberlin, D., Chamberlin E., Drought, N. E., Scott, W. E. Did They Succeed in College? New York: Harper, 1942.

15. Cronbach, L. J. Essentials of Psychological Testing, New York: Harper, 1960.

16. Grough, H. C. "The Construction of a Personality Scale for Predicting Scholastic Achievement," J. of Applied Psych., 37: 361-366, 1953.

17. Guilford, J. P. Fundamental Statistics in Psychology and Education. New York: McGraw-Hill, 1950.

18. Hills, John R., Knock, Joseph A., and Bush, Marilyn L. Freshman Norms for the University System of Georgia 1964-1966. Office of Testing and Guidance Regents of the University System of Georgia.

19. Holland, J. L. "The Prediction of College Grades from Personality and Aptitude Variables." J. of Ed. Psych., 51: 245-254, 1960.

20. Holland, J. L. "Prediction of College Grades from the Calif. Psych. Inventory and the Scholastic Aptitude test." J. of Educ. Research., 50: 135-142, Aug., 1959.

21. Holland, J. L. and Astin, A. W. "The Prediction of the Academic, Artistic, Scientific and Social Achievements of Undergraduates of Superior Scholastic Aptitude." J. of Ed. Psych., 53: 132-143, 1962.

22. Kim, Ki Suk, "The Use of Certain Measurements of Academic Aptitude, Study Habits, Motivation, and Personality in the Prediction of Academic Achievement." Unpubl. doctoral dissertation, LSU: Univ. of Michigan Microfilm No. 24,716.

23. Lichter, S. O., Rapien, E. B. Seibert, F. M. and Sklansky, M. A. The Dron Outs. New York: The Free Press of Glencoe, 1962.

24. Lieberman, L. R. and Chambers, J. L. "Differences Between Prisoners and Trade School Students on the Picture Identification Test." Perceptual and Motor Skill, 17: 355-361, 1963.

25. Lieberman, L. R.,and Chambers, J. L. "Cluster Analysis Technique Employed in Study Entitled Differences Between Prisoners and Trade School Students on the Picture Identification Test."

26. Lindquist, E. F. (Editor) Educational Measurement, Washington, D. C.: American Council on Education, 1951.

27. Malloy, J. "An Investigation of Scholastic Over and Under Achievement Among Female College Students," J. of Counseling Psych. :260-263, 1954.

28. McQuarry, J. F. "An Under-achievement Scale." J. of Educ. Research. 48: 393-399, 1955.

29. Mosier, Charles J. "Problems and Designs of Cross-Validation," Educ. Psych. Meas. 11: 5-11, 1951.

30. Murray, H. A. Exploration in Personality. New York: Oxford Univ. Press, 1938.

31. Nichols, Robert C. "Non-intellective Predictors of Achievement in College." National Merit Scholarship Corporation, Vol. 1, Number 6, 1965.

32. Nichols, R. C. and Holland, J. L. "Prediction of the First Year of College Performance of High Aptitude Students." Psych. Monographs 77 (7 whole) No. 570. 1963.

33. Roberts, Roy J. "Prediction of College Performance of Superior Students." National Merit Scholarship Corp. Vol 1, No. 5, 1965.

34. Sanford, Nevitt, "Some Social-Psychological Theory for Selecting College Students." The American College, New York: John Wiley and Sons, 1962.

35. Shaw, M. C. and Brown, D. J. "Scholastic Underachievement of Bright College Students." Personnel and Guidance Jour. 36: 195-199, Nov. 1957.

36. Siegel, Sidney Nonparametric Statistics for the Behavioral Sciences. New York: McGraw-Hill Book Co. 1956.

37. Super, Donald E., Appraising Vocational Fitness. New York: Harper, 1949.

38. Terman, L. M. and Oden, M. "The Significance of Deviates "II" Status of the Calif. Group After 16 Year" National Soc. for the Study of Educ., 39: 67-74, 1940.

39. Terman, L. M. and Oden, M. "The Significance of Deviates "III" Correlates of Adult Achievement in Calif. Gifted Group." National Society for the Study of Educ., 39: 74-89, 1940.

40. Tiebout, H. M. "The misnamed Lazy Student." Educational Record, 24: 113-129, 1943.

41. United States Office of Education, "Meaning of the Changes in the U.S. Population." U.S. News and World Report, Vol. 60, No. 2 January 10, 1966.

42. Walker, Helen M. and Lev, Joseph, Statistical Inference, New York: Henry Holt and Co. 1953.

BIOGRAPHICAL SKETCH

James Rawson Fisher was born November 9, 1929 at Charleston, West Virginia. He attended public schools in Arizona, California, Nevada, New Mexico, West Virginia, Kentucky, and Florida. He was graduated from Ketterlinus High School in St. Augustine, Florida in June, 1948. In June, 1952 he received the B.A.E. degree from the University of Florida. From 1952 until 1954 he served in the Field Artillery Branch of the United States Army. From 1954 until 1957 he taught at Howard Junior High School in Orlando, Florida. From 1957 until 1959 he was a Marine Special Agent for the Aetna Casualty & Surety Company in the state of Florida. In 1959 he entered graduate school at the University of Florida and worked as a graduate assistant until 1962. He received the M.Ed. degree in Counseling and Guidance with a minor in psychology in August, 1960. Upon completion of course work for the doctorate, in June, 1962, he served as interim professor at Mississippi State University during the summer of 1962. From September, 1962 until July, 1965 he was associate professor of psychology at Monroe Community College, Rochester, New York. Since July, 1965 he has served as Research Associate for the Charles L. Mix Fund, Staff Psychologist for the Americus-Sumter Guidance Center, and assistant professor of psychology at Georgia Southwestern College, Americus, Georgia.

James Rawson Fisher is married to the former Eloise Fishback. They are the parents of three boys. He is a member of Delta Chi,

Psy Chi, Phi Delta Kappa, The American Personnel and Guidance Association, The American Psychological Association, and The American Association of University Professors.

This dissertation was prepared under the direction of the chairman of the candidate's supervisory committee and has been approved by all members of that committee. It was submitted to the Dean of the College of Education and to the Graduate Council, and was approved as partial fulfillment of the requirements for the degree of Doctor of Education.

April, 1966

Dean, College of Education

Dean, Graduate School

Supervisory Committee:

Chairman